SOUTHERN MEDICAL JOURNAL

JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.

Vol. XXIV DECEMBER 1931 Number 12

FRACTURES AND DISLOCATIONS OF THE TARSUS: AN ANALYSIS OF A SERIES OF 109 CASES*

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It has been rightly said that any injury to the foot is a greater disability than to almost any other part of the body, for when the means of locomotion and support is interfered with the worker stops, no matter what his vocation is. Disabilities following fractures and dislocations of the foot are numerous, and especially so in those communities which are away from the large fracture clinics, and where the surgeons treat few cases. This discussion is presented for the purpose of adding information to the subject of fractures and dislocations of the tarsus.

The basis of this discussion is from a review of the x-rays of 1,069 injuries to the foot and ankle, representing 1,056 patients. In this number there are 111 injuries in 109 patients showing a fracture or dislocation of the tarsus. This constitutes about 10 per cent of the total number of injuries. Previously a review was made of 109 fracture dislocations of the ankle,[1] which were found in the first one thousand of this same series of x-rays. The injuries to the metatarsus and phalanges, and the accessory bones of the foot, have also been noted in this series. With one exception the total number of x-rays studied are from the files of the Emergency Hospital in Washington, D. C., over a four-year period from 1924 to 1928. During this time between ten and eleven thousand x-rays were taken in the hospital. The number of x-rays taken for injuries to the foot and ankle is about 10 per cent of this total number. In the total 1,069 injuries to the foot and ankle, there are 744 showing evidence of fractures and dislocations, or approximately 70 per cent. Of these 744, there are 524 of the ankle mortise, that is, of the lower ends of the tibia, fibula, or both, or approximately 70 per cent. There are 152 fractures of the metatarsus of phalanges, or 20 per cent. There are 111 fractures and dislocations of the tarsus, or 15 per cent (see *Chart No. 1*).

CHART NO. 1

ANALYSIS OF THE TARSAL FRACTURES

Total injuries to foot and ankle showing fractures or dislocations			744
Number of tarsal injuries			111
(or 14.9 per cent of total injuries)			
Fractures of the Separate Tarsal Bones:	No.	Per Cent of Tarsal Inj.	Per Cent of Total Inj.
Os calcis	54	48.7	7.25
Astragalus	36	32.4	4.84
Scaphoid	17	15.3	2.29
Cuboid	9	8.1	1.21
First cuneiform	11	9.9	1.48
Second cuneiform	5	4.5	.67
Third cuneiform	4	3.6	.54

In interpreting x-rays of the tarsus, one must be careful not to confuse an accessory bone with a small detached fracture fragment. The accessory bones have often been called fractures, whereas in reality they are separate and distinct bony nodules. Pfitzner[2] has said that 25 per cent of the human feet show one or the other of these ossicles. This statement was made in 1896, before the general use of x-rays. In this series of 1,069 x-rays of the foot and ankle, there have been noted 237 cases showing the presence of one or more accessory bones, or 22.2 per cent. These have been reported in a separate publication.[3]

In a great many injuries to the tarsus, there can be demonstrated no x-ray evidence of fracture, yet the patient may be disabled for months. In regard to this type of injury, Cotton[4] has said that tarsal injuries may be the result of a crushing trauma, and in these cases the result of the crushing force as such may be much more important than the specific damage to such bones as are broken. In this series there are probably a great many of this type of injury, but the exact number cannot be deter-

*Read in Section on Railway Surgery, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

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mined, as clinical observations have not been made on all cases. There is, however, one case of fracture of the os calcis which is most illustrative and instructive in this regard.

The initial x-rays of the injured foot taken immediately after the accident were negative for fractures. The trauma was caused by jumping about 4 feet onto a concrete surface which resulted in a twist of the ankle. The second x-ray taken six weeks later because of the persistence of pain and swelling, during which time the ankle had been treated for sprain, showed clearly three lines of increased calcification across the body and neck of the os calcis (*Fig. 1*). This could be interpreted only as meaning that there had been three linear fractures of the os calcis, which had been unrecognized for six weeks.

A discussion of the fractures observed in each tarsal bone will be given with a brief word about the mechanism of injury and treatment. This will be followed by a presentation of the types of dislocations of the tarsal bones observed in this series.

Fig. 1
X-ray of the fracture of the os calcis showing three lines of calcification which appeared six weeks after the original injury. The first x-ray taken immediately after the injury was reported negative.

FRACTURES OF THE ASTRAGALUS

There are 36 cases observed in 111 injuries to the tarsus, or 32.4 per cent. This number is 4.84 per cent of the total number of injuries to the foot and ankle. There are 15 in the right foot and 21 in the left. There are 12 cases unassociated with other fractures and 24 associated with other fractures. According to Stimson,[5] Scudder,[6] and Wilson and Cochrane,[7] this fracture is frequently associated with fractures of the os calcis. In this series there are 5 of the 36 cases associated with os calcis fractures. According to Stimson,[5] it is also frequently associated with fractures of the fibula and dislocations of the ankle. There are 15 of the 36 cases showing fractures of the fibula and 2 cases showing a lateral dislocation of the ankle.

The most common cause of a fracture of the astragalus is a fall from a height in which the patient lands on his feet with the knees straight. If the patient lands on his heels, the body of the astragalus may be broken; if he lands on the balls of his feet, the neck is most often broken. Sometimes extreme dorsi-flexion of the foot may cause this fracture. Dretzka[8] has said that the neck is the weakest part and is most often broken. This is true in this series, as the neck has been fractured in 17 cases, the body in 15, and the head in 3, and a fused os trigonum in 1. Cotton[4] has said that with a dislocation the bone breaks usually at the neck and the body is the part which is displaced. There are 18 of the cases with a complete fracture, 11 with an incomplete fracture and 7 with a detachment of a small fragment. Three of the cases are caused by a gunshot injury of the foot.

Fracture dislocations of the astragalus are usually reduced by open operation. This may be done with a closed manipulation. Bohler,[9] of Vienna, advocates the use of traction downward with a pin through the posterior portion of the body of the os calcis at the same time that forced plantar flexion is applied. He states that he seldom has to do an open operation on a fresh fracture dislocation of the astragalus where there is either a fracture of the neck or a compression fracture of the body. Following this the extremity is immobilized in plaster for eight weeks and when weight bearing is allowed, an arch support is given. Cotton[4] has suggested that in fractures of the neck of the astragalus the part be kept in plaster for four weeks, and weight bearing not be allowed for two months. The old unreduced fractures of the astragalus nearly always require re-

constructive surgery. Because of the position of the astragalus in the ankle mortise, it is necessary to have an exact reduction to obtain a good functional result. Sometimes an astragalectomy may be indicated, but the results are not altogether satisfactory. However, it is possible oftentimes to obtain a better walking foot with the astragalus out than in.

FRACTURES OF THE OS CALCIS

Wilson and Cochrane[7] have said that a fracture of the os calcis is one of the most serious injuries of the lower leg, and has more frequently resulted in permanent disability than almost any other fracture. This is due to the difficulty and almost impossibility of securing a replacement of the fragments into their original positions. Bahr[10] writes that the slightest change in structure of the os calcis can readily cause great discomfort.

There are 54 fractures of the os calcis in this series of 111 injuries to the tarsus, or 48.7 per cent. This constitutes 7.25 per cent of the 744 injuries to the ankle and foot. Lounsbury[11] reports 21 fractures of this bone in 1,000 fractures of all bones, or 2.1 per cent. Condit[12] says that it constitutes 1 per cent of all fractures in the building trades. Wilson and Cochrane[7] and other writers have said that not infrequently both os calces are broken. This is found to be the case in 2 of the 109 patients.

Of the 54 fractures there are 27 on the right side and 27 on the left. There are 30 unassociated with any other fracture of the foot or ankle, and 24 associated with other fractures. There are 8 associated with other fractures of the tarsal bones, 13 with fractures of the ankle, and 3 with fractures of both tarsus and ankle. In 4 of the cases associated with fractures, in which both malleoli or the external malleolus are broken, there is a lateral dislocation of the ankle.

Speed[13] has classified the fractures of the os calcis into four groups: (1) avulsion fracture, (2) fracture of the sustentaculum tali, (3) fracture of the trochlear process, and (4) compression fracture of the body. This classification is essentially the same as that given by Wilson and Cochrane[7] and other writers. The mechanism of a fracture of the os calcis is almost invariably a fall from a height on the heels to a hard surface with the knees straight. The os calcis gives away where the astragalus, which is strongly held together by the malleoli, suddenly drives down on to it with its wedge-shaped inferior surface. The bone is squashed out sideways. A constant factor in these compression types is the lateral broadening of the bone, filling in the hollow which is normally present beneath the external malleolus. The avulsion type, according to Dretzka,[8] is caused by a fall associated with a sudden contraction of the gastrocnemius with a pull on the Achilles tendon. This type is spoken of by Bohler[9] as a "duck-bill" fracture. Bohler[9] says that they do not result from an upward pull by the insertion of the Achilles tendon because they are situated above the insertion of the tendon; however, the posterior end of the bony fragment, which is separated either by a transverse or a longitudinal compression force is drawn upwards by the Achilles tendon when the foot is dorsiflexed.

An analysis of the fractures according to the part of the bone fractured shows 20 to be in the body alone, 12 in the neck, and 22 to involve both the body and the neck. Of these fractures, 29 show a comminution with 19 of these showing evidence of compression. There are 14 showing one linear crack across the bone. Speed[13] has written that 90 per cent of these fractures are compression fractures of the body. In analyzing these x-rays, it cannot always be demonstrated whether there is a compression or not. A great many have shown a definite comminution and a linear crack across the body of the bone. Force sufficient to give this type of fracture must have given a compression of the bone, and perhaps this fracture should come in the compression group. This number, then, constitutes 43 of the 54 fractures, or 79.6 per cent. There are 3 which show only the breaking off of a small fragment of bone, and 3 which are incomplete, 1 of the neck and 2 of the body. There is one avulsion fracture of the posterior superior surface of the bone (*Fig. 2*). There are 4 old fractures.

Cahill,[14] in analyzing the modes of production of this fracture in 72 cases, has found that the fracture is caused by a fall in 88 per cent of the cases, a direct blow or lateral crush in 5 per cent, indirect violence or a twist of the ankle in 2.5 per cent, and avulsion in 1.25 per cent, and a shearing, such as when the heel is caught between the floor and a moving elevator, in 1.25 per cent.

The treatment of fresh fractures of the os calcis without severe comminution and compression is immediate immobilization in plaster. The cast should be left on for a period of six weeks, but after the first two weeks it should be bivalved and daily massage given to the

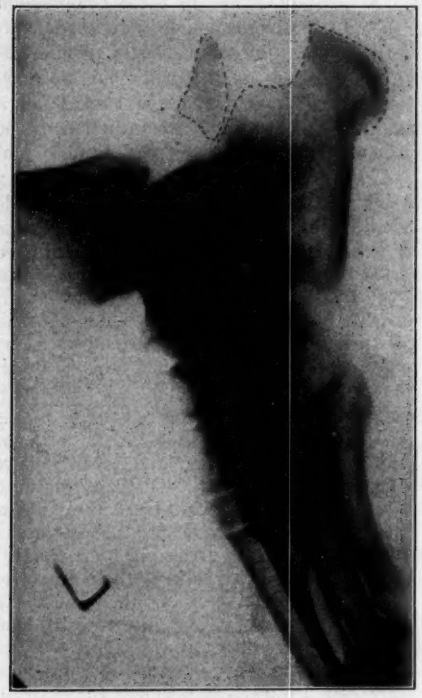

Fig. 2
X-ray of the avulsion or so-called "duck-bill" fracture of the os calcis. (X-ray outlines reenforced.)

part. No weight bearing is allowed for eight weeks. This should be followed by an arch support for three to four months. This is the treatment as outlined by Wilson and Cochrane[7] and is essentially the same as most authors advocate.

There is a divergence of opinion as to the best form of treatment for the compressed and comminuted fractures. Here the two chief obstacles of reduction are the pull of the Achilles tendon and the firm impaction of the fragments. The former one of these is sometimes overcome by a lengthening of the tendon, especially in the avulsion types of fracture. The latter obstacle is most often overcome in this country by the impaction treatment of Cotton.[4] Cotton advocates the application of ice tongs into the body of the bone, so as to secure a strong pull downward. The foot is now put in plantar flexion and with a padded mallet the heel is impacted with considerable force. Sometimes it may be necessary to leave the continuous traction on with the ice tongs for two or three weeks. This should be followed by motion of the ankle and foot in four weeks, but no weight bearing for eight to ten weeks. If there is a tendency toward lateral thickening of the bone, the patient should stay off the foot for three to four months. When the patient starts to walk, a raised heel should be given to the shoe with an insole. Th's is essentially the same treatment as recommended by Speed.[13]

Bohler[9] advocates the same principles in treatment, but the technic employed is somewhat different. He applies Steinman pins through the os calcis body, and between the lower portion of the tibia and Achilles tendon, so as to obtain a pull down on the os calcis and forward on the tibia. The fracture is now reduced by steady pressure on either side of the os calcis obtained by a "redresseur," which is similar to a padded vice.

Wilson[15] suggests an early subastragaloid arthrodesis and reports a series of 26 cases which were back at work in an average time of 7.2

Fig. 3
Anterior posterior x-ray of a lateral metatarso-tarsal dislocation with a complete medial displacement of the distal portion of the first cuneiform and a fracture of the cuboid. (X-ray outlines reenforced.) Note: This case is not included in the series here reported.

months after injury. Cabot and Binney[16] have estimated in reporting 111 cases that the average disability is from 6 months to 2 years. In some of the avulsion types of fracture it may be necessary to use a bone peg or screw to keep the avulsed fragment in place. In these cases the foot should always be put in plaster in marked plantar flexion with the knee bent.

Wilson and Cochrane[7] give the four causes of disability in these fractures as: (1) traumatic flat foot, (2) lateral displacement of the heel, (3) limitation of the lateral movements of the foot, and (4) spur formation on the under surface of the os calcis. Any one of these is sufficient reason for a prolonged and indefinite amount of pain following this fracture. The removal of spurs and a subastragaloid arthrodesis to stabilize the lateral movements of the foot will sometimes lead to a complete or partial relief of the disability.

FRACTURES OF THE SCAPHOID

Stimson[5] has said that fractures of the scaphoid are not very uncommon. There are 17 fractures and one dislocation without fracture in this series of 111 injuries to the tarsus, or 16.2 per cent. This is 2.42 per cent of the total fractures and dislocations of the foot and ankle. In these 18 cases, there were 12 in the left foot and 6 in the right. There were 6 unassociated with other fractures and 12 associated with fractures. There is one case in which both malleoli are broken, which shows a lateral dislocation of the ankle.

In discussing the mechanism of fracture, de Quervain[17] writes that, if a person falls from a height on his toes, the force is to a great extent gathered up by the scaphoid and transmitted to the astragalus. If the scaphoid is not sufficiently resistant, it becomes compressed, and, so to speak, is squeezed out of the skeleton of the foot, gaining the dorsal surface where it can be felt. This produces fracture dislocation of the scaphoid. It is added by Stimson[5] that there is a possibility of there being forced flexion of the medio-tarsal joint. The fragments usually undergo a comminution and flattening. There are 10 of the 18 cases showing this comminution and 4 showing an upward dislocation of one or more fragments. In interpreting x-rays of fractured scaphoids, the possibility of an accessory scaphoid must always be kept in mind because of its frequent occurrence. Holland[18] has said that it occurs in from 10 to 12 per cent of all cases. There are 4 cases which show an incomplete fracture and 3 which have small detached fragment. The one dislocation without fracture will be discussed in the part on dislocations.

The treatment of these simple fractures which show no displacement of fragments is immobilization in plaster for about six weeks; the cast should be bivalved and massage started after the second week. When weight bearing is allowed after 10 weeks, an arch support should be worn. An open operation may be necessary to reduce the fracture dislocations. Bohler[9] accomplishes this by closed manipulation in the following manner. Traction downward and backward is obtained through a Steinmann pin applied to the body of the os calcis while counter traction is obtained in a forward pull by putting rustless steel wire through the toes. If the fragments or fragment cannot be pushed in place after traction is applied, force is used to push the fragments down either manually or with the use of the "redresseur." If there is compression, care must be taken not to remove the plaster too early, as there is always a possibility of a recurrence of the compression. Ten weeks is considered the proper period of immobilization in plaster. The shoe should be built up on the inside with a special orthopedic heel and an insole with a long arch support.

FRACTURES OF THE CUBOID

It has been said by Cones[19] that this is one of the most uncommon of the unusual fractures of the foot. There are found 9 fractures of the cuboid in this series of 111 injuries to the tarsus, or 8.1 per cent. This number constitutes 1.21 per cent of the total injuries to the foot and ankle. All of these 9 fractures were in the right foot and were associated with other fractures. Plagemann[20] reports one fractured cuboid in 114 cases of foot fracture. Immelman[21] reports 20 cuboid fractures, 12 of which were unassociated and 8 of which were associated with other tarsal fractures. In these 9 cuboid fractures 6 are associated with other tarsal fractures.

An analysis as to type shows 2 to be comminuted, 2 to be linear, and 5 to have small detached fragments of bone. Stimson[5] has said that these fractures are generally marginal and usually show the association with fractures of other tarsal bones.

Cones[19] and Wilson and Cochrane[7] have said that they are caused principally by indirect violence. On the contrary, Tenton[22] has written that the cuboid is practically never fractured as a result of indirect traumatism of the

foot, and has given the following causes of fracture: (1) most often it is the result of a fall from a height on the toes with the foot in hyperextension; (2) from anterior posterior compression with the heel fixed and violent pressure exerted on the toes; (3) forced pronation with accompanying abduction of the forefoot.

The treatment of these fractures is usually immobilization in plaster for a period of about six weeks. The cast should be bivalved after two weeks and daily massage given. The treatment is usually associated with and governed by the treatment necessary for the other injuries to the foot and ankle.

FRACTURES OF THE FIRST CUNEIFORM

These fractures are so uncommon that scarcely any space is given to their discussion in the textbooks. There are 11 cases found in this series, which is 9.9 per cent of the 111 tarsal injuries, or 1.48 per cent of the total number of injuries to the foot and ankle. There are 6 in the right foot and 5 in the left. There are 3 not associated with the other fractures and 8 associated with other fractures. Ten of the 11 cases show a complete linear or comminuted fracture, while one shows only a small detached fragment.

This fracture is most often caused by a direct crushing force such as the foot being run over by the wheel of a truck. Els[23] has reported a case thought to be due to an avulsion of a fragment of bone at the attachment of the tibialis anticus. The author has one case in this series which is due to a direct blow from a horse kicking the foot.

The treatment of these fractures is usually immobilization in plaster for about six weeks. Massage is started at the end of the second week with the cast bivalved. Weight bearing should not be allowed for 10 weeks and then the inside of the shoe should be elevated and a long arch insole given.

FRACTURES OF THE SECOND AND THIRD CUNEIFORMS

These fractures are again so uncommon that little space is given to their discussion in textbooks. They are usually due to a crushing force from above, such as a wheel running over the foot or a heavy weight which is dropped on the foot.

There are 5 fractures of the second cuneiform; 3 are in the right foot and 2 in the left. They constitute 4.5 per cent of the tarsal injuries and 0.67 per cent of the total foot and ankle injuries. They are all associated with other fractures of the tarsus or the metatarsus. All the fractures are complete, either linear or comminuted.

There are 4 cases of fracture of the third cuneiform; 2 are in the right foot and 2 in the left. They constitute 3.6 per cent of the tarsal injuries and 0.54 per cent of the total foot and ankle injuries. As with the second cuneiform, they are all complete and associated with other fractures of the tarsus or metatarsus.

The treatment of these fractures is immobilization in plaster for about six weeks, and massage is started at the end of the second week with the cast bivalved. Weight bearing should not be allowed for 10 weeks, although passive motion can be carried out after six weeks. The treatment is associated with that of the treatment necessary for the other injuries.

DISLOCATIONS OF THE TARSUS

Dislocations of the articulations of the tarsus, with the exception of those at the tibio-astragalar joint, are relatively uncommon. It is also un-

Fig. 4
X-ray of an outward calcaneo-cuboid dislocation with associated fractures. (X-ray outlines reenforced.)

Fig. 5
Lateral x-ray of Fig. 4 showing partial forward dislocation of the os calcis beneath the astragalus and fractures of the anterior portion of the os calcis and first cuneiform.

common to have a dislocation of the tibio-astragalar joint associated with a fracture of one of the tarsal bones. In this series of 111 injuries to the tarsus there are 19 separate dislocations. This constitutes 17.1 per cent of the 111 tarsal injuries and 2.55 per cent of the total injuries to the foot and ankle. There are 18 of this number associated with fractures of the tarsal bones. A discussion of the mechanism and treatment of these cases will not be given.

An analysis of the 19 cases shows 7 tibio-astragalar dislocations, all of which are lateral in type; 1 subastragaloid dislocation medial in type; 4 fracture dislocations of the scaphoid in which the fragments are dorsally displaced; 1 downward dislocation of the scaphoid; 1 combined calcaneo-cuboid dislocation, in which the cuboid is displaced outward, and a partial forward subastragaloid dislocation; and 5 tarso-metatarsal dislocations, 2 of which are upward and lateral in type, and 3 downward. Wilson and Cochrane[7] have classified these dislocations exclusive of the tibio-tarsal group as follows: (1) calcaneo-astragalo-scaphoid, including two types, the incomplete or subastragaloid, and the total dislocation of the astragalus; (2) medio-tarsal; and (3) tarso-metatarsal. In this series there are no total dislocations of the astragalus. The scaphoid and calcaneo-cuboid dislocation can be included under the medio-tarsal dislocations.

A subastragaloid dislocation is extremely rare. The author in 1928 reported one case, and reviewed 138 cases found in the literature to that time.[24] The medial type is found to be the most common and constitutes 55.4 per cent of this total number. It is shown to be six times more common in men than in women.

Fig. 6
Lateral x-ray of downward dislocation of the scaphoid without fracture.

Fig. 7
Anterior posterior x-ray of downward dislocation of the scaphoid

The patient with the medial subastragaloid dislocation in this series is a colored man of about 50 who, on stepping into a hole while carrying a timber weighing about 150 pounds on his shoulder, gave his left ankle a severe wrench. There is also a small fragment of bone detached from the posterior astragalus. It was easily reduced and the patient was back at labor in about six months' time. The small detached fragment apparently united.

Stimson[5] reports only one case of dislocation of the cuboid which was not associated with other dislocations, and in this case the cuboid was dislocated upward in connection with the fifth metatarsal. In the case reported (*Figs. 4* and *5*) the cuboid is dislocated outward in connection with the fifth metatarsal, but is associated with comminuted fractures of the first and second cuneiforms and the anterior portion of the neck of the os calcis and a partial forward subastragaloid dislocation. The cause of injury in this case was a truck which ran over the foot of the patient. An open operation was necessary to reduce the calcaneo-cuboid dislocation. No attempt was made to reduce the forward dislocation of the os calcis beneath the astragalus.

The most interesting of the dislocations in this series is the downward dislocation of the scaphoid (*Figs. 6* and *7*), which was unassociated with fracture. In this patient the foot was injured by the edge of a heavy iron cover to an asphalt heating machine, which was about 2 cm. wide, and which came down with considerable force on to the dorsum of the foot. The scaphoid was pushed downward between the head of the astragalus and the first cuneiform as if it had been the middle one of three wooden blocks in a row. The dislocation was easily reduced by force upward on the under surface of the scaphoid as the foot was forcibly plantar flexed at this point (*Fig. 8*). The end result was excellent and the patient was back at work in three months' time.

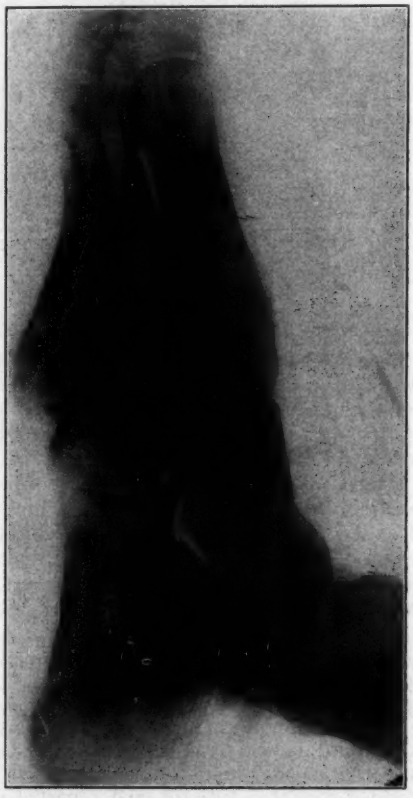

Fig. 8
Lateral x-ray of downward dislocation of the scaphoid after reduction.

CONCLUSIONS

(1) A series of 109 patients with 111 fractures and dislocations of the tarsus is reported.

(2) In this series there are 136 separate fractures of the tarsal bones.

(3) The os calcis is fractured in 54 cases, or 48.7 per cent of the tarsal injuries, the astragalus in 36, or 32.4 per cent, the scaphoid in 17, or 15.3 per cent, the first cuneiform in 11, or 9.9 per cent, the cuboid in 9, or 8.1 per cent, the second cuneiform in 5, or 4.5 per cent, and the third cuneiform in 4, or 3.6 per cent. A brief discussion is given of the mechanism of injury and treatment of each fracture.

(4) There are 19 dislocations in this series, divided as follows: 7 tibio-tarsal, 1 medial subastragaloid, 1 complete scaphoid, 4 partial fracture dislocations of the scaphoid, 1 calcaneocuboid and partial forward subastragaloid, and 5 tarso-metatarsal.*

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*Appreciation is expressed to Dr. E. M. McPeak, of the X-Ray Department of the Emergency Hospital, who gave invaluable assistance in the interpretation of the x-rays, and to Dr. G. W. Leadbetter, of Washington, D. C., who has kindly allowed me to include the two cases represented by *Fig. 3* and *Figs. 6, 7* and *8* in this report.

DISCUSSION (*Abstract*)

Dr. Lucius E. Burch, Nashville, Tenn.—Every injury to the foot which is the result of great trauma should be treated as a fracture or a dislocation, even if the x-ray fails to show any abnormality, and in such cases subsequent x-rays should invariably be made.

The essayist has wisely emphasized the necessity of a long period of rest following these injuries, and the importance of not bearing weight on the injured part until ten to twelve weeks have elapsed.

Dr. Southgate Leigh, Norfolk, Va.—I never think of fractures of the foot without recalling the case of a man who was in a construction elevator when it fell four stories. His life was saved by his presence of mind in standing on his toes. He suffered nothing more than several impacted fractures of the bones of the feet.

An important point brought out by Dr. Shands is the necessity of getting perfect apposition in all fractures of the feet, and this brings up the question of operation in fractures which cannot otherwise be properly set.

As in the discussion on fractures at the Miami meeting, I would again refer to the urgent necessity of paying more attention to strict surgical cleanliness, an absolute requisite in the safe operative handling of bones.

If the hospital and operating room are kept as free as possible from sepsis and the surgeon and assistants are clean, bones can be handled with impunity, just as well as soft tissues. Plates, screws and nails do not cause infection. They cannot be used, however, unless the strictest asepsis is observed. Too many brilliant operations are being marred by infection.

Strict operating room control is necessary along with the prompt catching and destruction of septic discharges in the operating room and wards.

Dr. Robert Carothers, Cincinnati, Ohio.—There are five distinct fractures of the ankle. One of these is the Potts fracture. I object to it because I object to the Potts method of treating an ankle fracture.

Dr. Bohler, in Vienna, had nine os calcis fractures over a period of seven or eight weeks, during which I was working with him. His contribution to bone surgery in the os calcis fracture is one of the greatest that we have.

If you get bones in apposition, or almost in apposition, the trauma is over. When the trauma is over, the swelling is over. When the swelling is over, put the plaster next to the skin without padding, because you can hold the cast better and there is no danger if you watch the cast. We keep the fractures in that position with traction; then at the end of

about two weeks, or three at the most, we take the pin out and put a walking iron on them. We have our ankle fractures walking in three or four days. We have records of men who returned to work in a week. The patient is thus doing his own physical therapy.

At the end of eight weeks we get them out and the ankle in more than 95 per cent of cases is perfectly molded, so that they do not go to the physiotherapy laboratory.

Twenty years ago, or even ten years ago, I dreaded an os calcis fracture. Now, I rather like them.

Dr. W. W. Harper, Selma, Ala.—Recently I attended a surgical meeting where a treatment of fractures of the tarsal bones and the metatarsal bones like that of Dr. Carothers was described. The patient's leg and foot is put up in plaster of Paris ordinarily, with plenty of bandaging for four or five days. In four or five days the swelling has subsided with the leg elevated. Then, this plaster is taken up, stockinette is put on and plaster of Paris applied. The patient is put on a two-inch felt heel, the heel is held on by adhesive plaster and he is given a walking stick and told to walk. Excellent results are reported.

Dr. Charles C. Garr, Lexington, Ky.—There are certain small fractures in the tarsal bones that do not show in the ordinary antero-posterior and lateral x-ray films. I have had recently two such cases, but the fracture line was visible in films made in the semi-lateral view. The semi-lateral views are a distinct help in diagnosis.

Dr. Shands (closing).—The question of sepsis in treating any type of fracture is an extremely important one.

Dr. Carothers' point about the Bohler treatment of fractures is certainly well taken. Dr. Bohler has given us the best contribution to the treatment of fractures that has come out in the last five or ten years. I have had no personal experience in treating fractures of the os calcis by the method which Dr. Bohler recommends, but I believe that it will be the form of treatment which will be generally used in the future. Many of us are, perhaps, afraid to put pins and ice tongs into normal uninfected bones to get traction on fractured fragments, but it has been shown by Dr. Bohler, and also in the use of the Schanz screw abroad, that we can put a screw and foreign material into the bone and allow them to be incorporated in plaster and there will be no resultant infection.

Dr. Harper spoke about the treatment of a tarsal injury by a non-padded cast. This is very much the same as the Delbet treatment recommended several years ago in fractures of the lower leg. The only thing is that the Delbet splints were put on the skin immediately after the injury. They were changed in three or four days when the swelling went down, and then the patient was allowed to walk.

The point Dr. Garr makes about the x-ray of the tarsal bones is certainly important. When we feel that there is a fracture of the tarsal bones and the x-ray comes back negative, it is better to suggest to the roentgenologist to do a three-quarters x-ray.

HYDROCEPHALUS SUCCESSFULLY TREATED BY THE USE OF THEOBROMIN SODIOSALICYLATE*

By HAROLD T. NESBIT, M.D.,
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From the work of Dandy and Blackfan,[1] it is known that hydrocephalus results from an excessive secretion or a diminished absorption of the spinal fluid. It was demonstrated that this fluid is secreted in the choroid plexus in the cerebral ventricles, where it passes out through the aqueduct of Sylvius and foramina of Luschka and Magendie to the subarachnoid spaces over the surface of the brain and surrounding the spinal cord. Here the chief absorption occurs. Normally a perfect balance is maintained between the secretion and absorption, the spinal fluid filling the ventricles and subarachnoid spaces and remaining at a low pressure. When this balance is disturbed, so that there is an excess of spinal fluid, the hydrostatic pressure rises, producing a compression of the brain which, unless relieved, causes atrophy of the brain substance and progressive enlargement of the cranial cavity. Since the fluid is secreted in the ventricles and absorbed in the subarachnoid spaces, the pressure will be greater in the ventricles, where no absorption takes place, than elsewhere, producing an internal hydrocephalus. Apart from this, external hydrocephalus is associated with an inflammatory condition of the meninges, where there is an outpouring of an exudate into the subarachnoid spaces, with a consequent increase of pressure over the surface of the brain.

This presentation is concerned with internal hydrocephalus only, which appears with a much greater frequency and is of more clinical importance. There are two general types, classified according to the etiology: obstructive and communicative.

Obstructive hydrocephalus occurs when the paths from the choroid plexus in the ventricles, leading to the subarachnoid spaces, are blocked. Such an obstruction may result from adhesions, an inflammatory condition, tumors, particularly those located in the region of the cerebellum, or from congenital anomalies or birth injury. As

*Received for publication November 2, 1931.
*From the Southwest Clinic.
*Read before the Dallas County Medical Society on May 28, 1931.

a consequence, little or no fluid escapes from the ventricles, where it accumulates under markedly increased pressure. With this condition, lumbar puncture reveals the absence of fluid in the subarachnoid space. Ventricular puncture, on the other hand, will indicate an excessive accumulation.

Communicating hydrocephalus will exist even though the channels from the choroid plexus remain open and is caused if absorption is prevented by damage to the subarachnoid vessels and lymphatics concerned with absorption, or from obliteration of a portion of the subarachnoid space with a consequent lessening of the normal cubical capacity. The second and most common form of communicating hydrocephalus is that accompanied by a disturbance in the balance between secretion and absorption, and where no other pathological process can be demonstrated. It is presumed that, in these patients, the fluid is secreted so rapidly that the normal absorption cannot cope with the excessive amount, producing an increased hydrostatic pressure in the ventricles and subarachnoid spaces as well (*Fig. 1*).

This is the usual type of congenital hydrocephalus and bears a close relationship to spina bifida. An excess in the production of spinal fluid during intrauterine life is presumably a most important factor in the causation of spina bifida. The increased pressure forces the spinal meninges to protrude, thus preventing closure of the spinal canal. Frequently the surgical closure of a spina bifida results in hydrocephalus.

Hydrocephalus is easily diagnosed from the increased size and progressive enlargement of the head and the characteristic bulging of the forehead; in infants, by the wide open sutures and bulging fontanels, the visual disturbance, the characteristic rolling down of the eyes, and by the tympanic percussion note elicited over the skull, known as Macewen's sign. The determination of the particular type of hydrocephalus, however, is necessary before intelligent treatment can be inaugurated. Consequently, active meningitis and syphilis must be eliminated by the usual laboratory methods. Whether the hydrocephalus is of the communicating type, with open channels but with increased pressure of the fluid, or is the result of obstruction between the ventricles and subarachnoid spaces, must be determined to provide appropriate treatment. A ready flow of fluid from a spinal puncture, particularly if pressure on the fontanel or jugulars causes an increased flow, indicates that a free communication exists between the ventricles and spinal subarachnoid. Failure to get fluid, or even a scanty flow, would mean that a blockage exists at some intervening point. Injection of air or dyes into the ventricles, recommended by Dandy[2] and Dandy and Blackfan,[3] is of great value in determining the character of hydrocephalus. To resort to its use, clinically, is not necessary in the majority of cases. The treatment of the obstructive type of hydrocephalus is purely surgical. Many ingenious surgical procedures have been used. However, the high operative mortality which ensues scarcely warrants such measures.

Until recently, all medical means of controlling disturbed absorption and secretion of the cerebrospinal fluid, such as occur in communicating hydrocephalus, had met with indifferent success. During his observations on edema, Marriott[4] noted that when the surface tension of the blood was low fluids tended to pass out of the blood into serous cavities and intercellular spaces. When the surface tension was again raised fluid tended to pass in the opposite direction. It was noted further that certain purin diuretics caused a distinct elevation in the blood

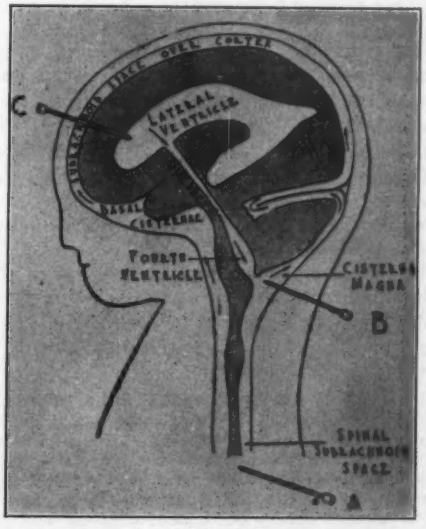

Fig. 1

Illustration indicating the paths of circulation of cerebrospinal fluid and demonstrating where punctures may be made to determine the hydrostatic pressure. With internal hydrocephalus of the communicating type there is an increase of this pressure at points A, B, and C. With an obstructive type, it is decreased or absent at A or B, increased in the lateral ventricles (C).

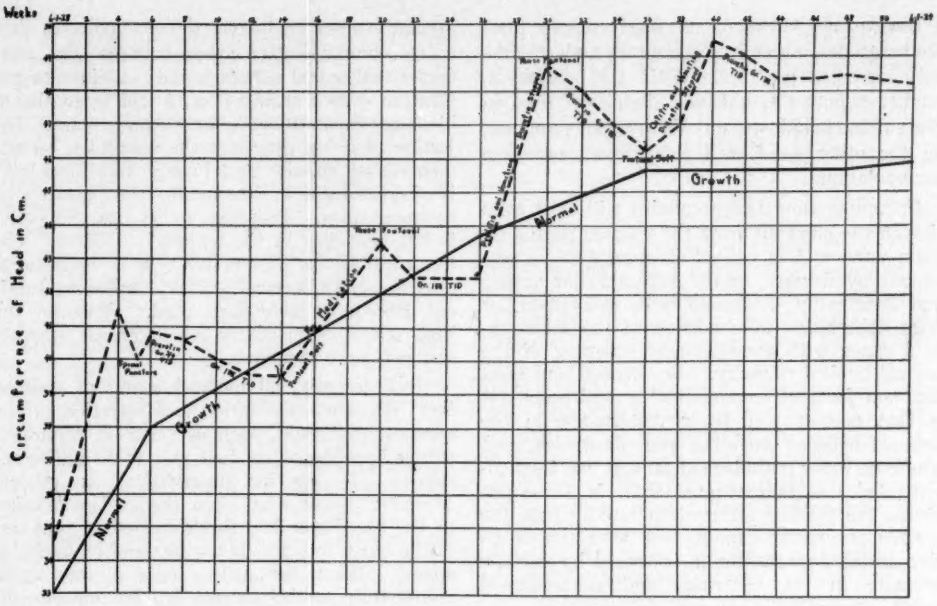

Fig. 2

The solid line represents the average occipito-fronto circumference in cm. during the first year of life. Fluctuations from the normal, as occurred in Case No. 1, are indicated by the broken line. Note the marked increase of the circumference at the four periods when the theobromin sodiosalicylate was not administered.

surface tension. From these findings it has been reasoned that, by raising the surface tension of the blood, a passage of spinal fluid from the subarachnoid spaces would occur into the blood, consequently, by using theobromin sodiosalicylate (diuretin) orally in infants with this type of hydrocephalus, excellent results have been obtained. Where complete obstruction of the ventricles is present, no improvement can be expected, because of the lack of absorptive vessels in the ventricles.

To illustrate further the brilliant results which may be obtained by this medication, I wish to present the following cases:

B. G. T. was seen at one month of age. The birth had been uneventful. The mother stated that the infant appeared normal at birth, but that the head had become enlarged during the intervening four weeks. The infant was on a cow's milk formula which it took readily. No vomiting had occurred. The weight was 8 lbs. 10 oz., representing a gain of 17 oz. over the birth weight. Other than the large head, the mother complained that the child was very listless, that it seldom cried, and that it tended to look down most of the time.

Physical examination revealed a well-nourished infant with the head disproportionately enlarged. The occipito-frontal circumference was 41.5 cm., the chest at the nipple line measured 34 cm., the body length was 20.8 cm. The sutures were wide open, the parietal bones being widely separated. The integument between the bones was bulging and tense. The forehead was prominent, the scalp veins were conspicuous. The eyes were rolled down, the pupils were dilated and reacted sluggishly to light. The eye ground examination revealed dilated, tortuous retinal vessels. Examination, otherwise, was negative.

The spinal fluid was under increased pressure. Twenty-eight c. c. were withdrawn. Pressure over the fontanel produced an increased flow of fluid from the needle, indicating that a free communication existed between the ventricles and subarachnoid space. Examination of the spinal fluid was negative. Four days after the spinal puncture the head measurement was 40 cm. At the end of two weeks it measured 40.8 cm. (*Fig. 2*).

Theobromin sodiosalicylate, ¾ grain, was given three times a day for two weeks. As no intolerance to the drug was evidenced and because there was no apparent improvement in the infant's condition, the dosage was doubled. At the end of eight weeks the infant presented no symptoms of increased intracranial pressure. The theobromin sodiosalicylate was discontinued with a consequent return of hydrocephalus, as indicated by bulging, tense fontanels, listlessness and an increase of head circumference to 43.4 cm. Readministration of the drug again resulted in a disappearance of these symptoms. On December 3, because of an

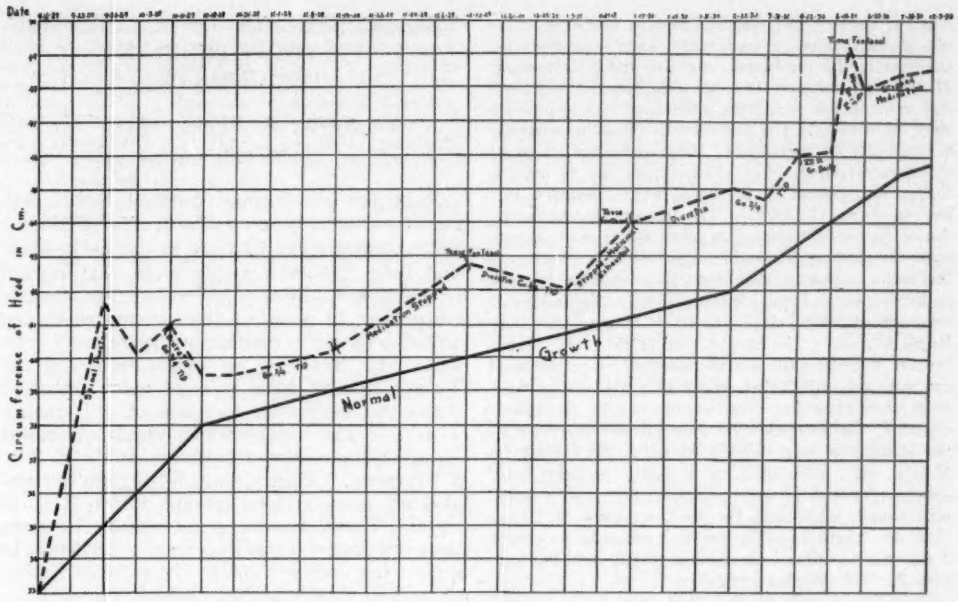

Fig. 3

The average normal circumference of the head during the first fifteen months of life, indicated by the solid line, is contrasted with the circumference of the head, represented by the broken line, in Case No. 2.

attack of acute tonsillitis, the theobromin sodiosalicylate was temporarily stopped. During the following three weeks the infant experienced an acute pyelitis associated with high fever. At this time the theobromin sodiosalicylate was promptly vomited so that its use was necessarily discontinued. Consequent to this, the increase in the intracranial pressure was little less than startling. The head circumference increased from 42.6 cm. to 48.8 cm. The fontanels were bulging and tense. Macewen's sign was noted. The eyes were rolled down, nystagmus was present. On December 31, the pyelitis had improved so that small doses of theobromin sodiosalicylate, grains ¼, were given in the formula four times a day. This was subsequently increased to grains 1½ three times daily. Under this treatment the characteristic symptoms of hydrocephalus again subsided, only to return during a second illness six weeks later. Again theobromin sodiosalicylate was necessarily stopped for 26 days. The infant at this time had an acute tonsillitis associated with double otitis media. After convalescence at the age of 9½ months, the medication was resumed with a lessening of the intracranial tension. There has been no return of these symptoms to date. At the age of 14 months the theobromin sodiosalicylate was stopped entirely. The child is nearly 3 three years old, and other than having a slightly enlarged head seems to be normal in every respect.

B. G. F. was born September 16, 1929, at the Methodist Hospital. The birth was uneventful, the birth weight 6 lb. 2 oz. The family history was negative. Soon after birth the head increased rapidly in size. At two weeks of age examination revealed unmistakable hydrocephalus. The fontanels and sutures were wide open and bulging. The forehead was prominent. Nystagmus was present. The eyes were rolled down in a manner characteristic of hydrocephalus. Macewen's sign could be elicited over the skull. The infant was entirely on breast milk, but for three days projectile vomiting had occurred. The occipito-frontal circumference was 41.8 cm., representing an increase of 8.3 cm. since birth. The body length was 53 cm., the chest at the nipple line measured 30 cm. The child was hypertonic. All reflexes, however, appeared normal. Spinal puncture showed a clear fluid under greatly increased pressure. Twenty c. c. were removed. Pressure on the fontanel caused an increased flow from the needle, indicating the hydrocephalus to be of the communicating type. Examination of the spinal fluid was entirely negative (*Fig. 3*).

Following the relief afforded by the drainage, the vomiting ceased. The nystagmus was absent for several days. One week later, on October 3, 1929, the symptoms, other than vomiting, had reappeared. The head measurement was 41 cm. Theobromin sodiosalicylate was then administered, grains ¾, three times daily. One week later the head measured 39.5 cm. During the ensuing five weeks, on this medication, the head enlarged only 0.8 cm. Because of the satisfactory progress, the theobromin sodiosalicylate was stopped. Four weeks later symptoms of hydrocephalus had reappeared. The head circumference was 42.8 cm. The medication was then resumed. Three weeks subsequent, on January 3, 1930, the head measurement was 42 cm. The fontanel was soft. Several days later, in a hurried trip

into the country, the mother failed to renew her supply of medication. Consequently, after a two weeks' cessation of the theobromin sodiosalicylate, on January 17, the head measured 44.2 cm. The fontanel was tense and unmistakable symptoms of increased cranial pressure were again noted. The following five months witnessed a progressive hydrocephalus. The theobromin sodiosalicylate in maximum doses had not been able to prevent further enlargement of the head, which measured 49.3 cm. on June 14, 1930. The anterior fontanel evidenced increased tension. Apparently extreme pressure from the fluid on the brain tissue had been avoided, as the infant appeared alert mentally, was able to hold its head erect, and endeavored to sit up. No nystagmus was present. The chest measured 43 cm., the body length 72.3 cm. The weight was 18 lb. 6 oz. Theobromin sodiosalicylate from another pharmaceutical company was substituted, grains 1½, eight times daily. Since then there has been no advance in the hydrocephalus. On September 16, 1930 (at one year of age) the medication was stopped entirely. The infant on May 3, 1931, other than for a slightly enlarged head, appeared normal in every respect. She was walking, used simple words and the head measured 50.5 cm.; chest 48; length 78. The fontanel was soft, measuring 2 x 2 cm. Continued observation of this child indicates that she is developing normally.

SUMMARY

Once the diagnosis of hydrocephalus has been established, an extremely grave prognosis is known to exist. Until recently this condition has been considered as incurable. There are now three methods of treatment available, which have occasionally been attended by favorable results. These methods include: (1) operative relief of obstructive types, occasionally with a brilliant result but associated with a high mortality rate; (2) repeated lumbar or cisterna punctures, which usually lead to but temporary improvement, and (3) the medical treatment with theobromin sodiosalicylate. Because of the apparent harmlessness of this medical treatment and the otherwise almost hopeless outlook, it is believed that this means should be given a trial in communicating hydrocephalus before one resorts to the surgical procedures which are attended by a high mortality. Two instances of communicating hydrocephalus in infants, treated with apparent success by the use of theobromin sodiosalicylate, have been presented.

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THE OCCURRENCE OF A CORONARY T-WAVE IN PURULENT PERICARDITIS*

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Since the experimental work of Smith[1] and the first clinical observations of Pardee[2] on the electrocardiographic findings in coronary occlusion there has been ample proof that certain typical abnormalities of the ventricular complex are present in many of the patients who have occlusion of one or another of the coronary arteries. This has been so emphasized and the T-wave changes have been so much discussed that many have come to speak of a "coronary T-wave." The changes which denote a so-called coronary T-wave are a deviation of the R-T or S-T interval. A feature which has been less emphasized is an arching upward of the R-T interval. These changes occur usually in more than one lead. There has been a tendency to neglect the consideration of the same or similar changes in other conditions besides coronary occlusion. The case here reported does emphasize that fact, especially since there was associated with the electrocardiographic changes a clinical picture the chief feature of which was severe precordial pain.

CASE REPORT

A well developed negro male, age twenty-two years, of large frame and weighing about 200 pounds, was admitted to the medical service of the Emory University Division of Grady Hospital on March 12, 1931, with a complaint of shortness of breath. He dated his illness from March 4, when a keg of nails had fallen on his right ankle. He did not stop work and had no symptoms except those referable to his injury. The actual onset, however, was on March 8. He had just finished shaving at 12:00 noon when he experienced the sudden onset of extremely severe precordial pain with rather wide generalization of the pain and radiation down the left arm as far as the elbow. He had a feeling of extreme anxiety and impending disaster. His vision became blurred and he had difficulty in getting to his bed. There was also marked shortness of breath. The pain continued with slight improvement until the next morning. It had not recurred. The shortness of breath, however, persisted and at the time of admission was the outstanding symptom. There had been no chill and no cough or hemoptysis. His family history was essentially negative. His past history showed that he had had the usual diseases of childhood with no complications. There was no history of rheumatism and only an occasional mild sore throat. Five years before admission he had a single slightly painful

*Received for publication October 16, 1931.

*From the medical service of the Emory University Division of Grady Hospital.

sore on his penis. This remained for one week and healed spontaneously. He had subsequently received four injections of some kind in his hip because he was said to have bad blood. One year before admission he had gonorrhea. There was no history of headache. There had been slight tinnitus and vertigo for one year and occasional epistaxis. He had had slight dyspnea on exertion for one year. He had been married two years. His wife had not been pregnant.

Physical examination on admission showed a temperature of 99° F., pulse 108, and respirations 40 per minute. He was alert mentally and apparently in no acute pain, but quite dyspneic and propped up in bed. Retinal examination showed clear discs and no sclerosis of the vessels. The breath was fetid. There was a moderate marginal gingivitis. The neck veins were moderately engorged. The thorax was large and well developed. Expansion was poor, though equal on the two sides. The respirations were fast and shallow. Resonance was somewhat diminished at both bases below the angle of the scapula and over this area breath sounds were diminished. Over this same area were many small and medium moist rales. A few moist rales were also heard in both lower axillae and an occasional moist rale anteriorly just to the right of the sternum in the third and fourth interspaces. The apex impulse of the heart could not be seen and was not localized on palpation. The left border of dullness measured 14 cm. in the fifth interspace and the retromanubrial dullness 9 cm. in the second interspace. At the apex the sounds were distant and barely audible. They were also quite distant over the base. There were no murmurs and a friction rub was not heard. The blood pressure was 115 systolic and 80 diastolic. The pulse was of poor volume, regular, 108 per minute. The abdomen was essentially negative. The penis showed a single small scar on the prepuce. There was a small scar in each inguinal region. The scrotum was greatly thickened and showed several small sinuses which exuded pus. There was slight edema of the feet and ankles and a small scar of a recent abrasion on the lateral aspect of the right ankle. On the left forearm was an area of recent abrasion with a surrounding area of redness. Epitrochlear and axillary lymph nodes were palpable on the left. Glands were also palpable in both inguinal regions. The reflexes were normal.

Laboratory studies showed: (1) red blood count 2,700,000; hemoglobin, 65 per cent; white blood cells, 32,250 with 83 per cent polymorphonuclears. (2) The urine was acid, specific gravity 1.012, albumin 2 plus, contained numerous granular casts and an occasional white blood cell. (3) The blood sugar was 166.6; nonprotein nitrogen 100, and creatinine 3. (4) Blood culture on March 14 showed a pneumococcus. (5) The blood Wassermann was negative.

Clinical Course.—His temperature ran a septic course with variations from 99 to 103° F. He became progressively more dyspneic, finally cyanotic and died on March 15, three days after admission.

Autopsy was performed by Dr. Jack C. Norris and his findings are reported here. There was bilateral purulent pleurisy. The lower lobe of the right lung showed a recent consolidation and there was also a resolving pneumonia in the left upper lobe. The pericardium was filled with 1,000 c. c. of purulent fluid and there were numerous fibrinous adhesions. The heart was enlarged and weighed 550 gm. It was covered with a purulent shaggy exudate. The right heart was dilated and the left hypertrophied. The coronaries were tortuous. There was an acute myocardial reaction secondary to the pericarditis and in places this involved the adventitia of the arteries themselves. Dissection of the coronary arteries failed to show an occlusion. The aorta was normal. The liver was congested and showed focal necrosis. The spleen was enlarged and hyperplastic. The kidneys revealed cloudy swelling, congestion and a thickened capsule. The scrotum showed the same features as described in the physical examination.

An electrocardiogram was taken on March 14. It is reproduced in *Fig. 1* and shows in leads I and II an elevated plateau-like R-T interval and an inverted T-wave. This might well be classed as a coronary T-wave. There is also a left axis deviation and slurring of the QRS in lead III.

LITERATURE

Scott, Feil and Katz[3] have reported the occurrence of an elevated R-T interval in leads I and II in a patient who was found at autopsy to have 400 c. c. of purulent fluid in the pericardium. The pneumococcus was demonstrated in the exudate. The same authors have reported the occurrence of R-T elevation in leads i and ii along with elevation of the S-T interval in lead iii in a patient with a hemopericardium following rupture of an aortic aneurysm and in whom no evidence of myocardial involvement could be found at autopsy. This led them to conclude that the changes in the T-wave were secondary to increased intrapericardial pressure which by decreasing the blood supply to the heart muscle caused anoxemia which was itself responsible for the changes in the electrocardiogram. In an effort to prove this hypothesis they took tracings before and after distention of the pericardium with saline in experimental animals. They found three types of abnormal ventricular complexes one of which coincided closely with the changes seen in the clinical cases previously referred to.

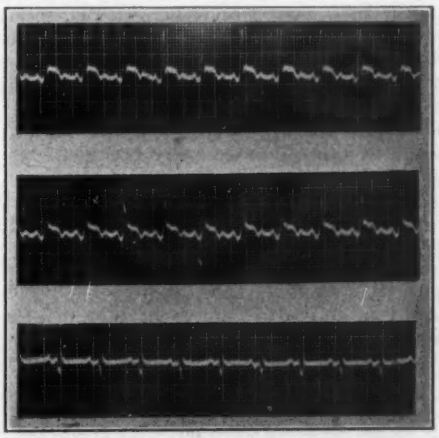

Fig. 1

Top—Lead I
Center—Lead II
Bottom—Lead III
March 14. Shows in leads I and II the elevated plateau-like R-T interval and in lead III a deep S-wave and slurring of the QRS.

Pardee and Porte[4] reported three cases with coronary T-waves in rheumatic pericarditis. They conclude that the changes in the T-wave are due to a complicating myocarditis which was proven at autopsy to exist in one of their cases. Cohn and Swift[5] have reported similar changes in the electrocardiogram as occurring in rheumatic myocarditis and Levine[6] reported deviation of the R-T interval in uncomplicated lobar pneumonia after the crisis.

COMMENT

In the case here reported there was on careful study of the gross pathological specimen with dissection of the coronary arteries no evidence of occlusion. Certainly an occlusion sufficient to have produced the very marked changes seen in the electrocardiogram would not have been overlooked. It is true that with any case of pneumococcic pericarditis there is involvement of the myocardium for a depth of one or two millimeters. The occurrence of the T-wave changes could be explained on this basis. It is possible also that the partial anoxemia resulting from increased intrapericardial pressure played a part in producing the changes.

Sigler,[7] in a recent paper, also emphasizes the occurrence of coronary T-waves in conditions other than coronary occlusion. He states, however, that the so-called coronary T-wave may be considered pathognomonic when present with a typical or atypical clinical picture. On the other hand, the patient here reported did present a clinical picture which was in some respects suggestive of coronary occlusion and yet at autopsy showed an entirely unrelated condition. It therefore seems that the designation of any given type of change in the electrocardiogram as a coronary T-wave is a bad practice which may mislead some individuals who are not familiar with the occurrence of such changes in conditions other than coronary occlusion.

SUMMARY

A case of pneumococcic pericarditis with the type of abnormal T-wave frequently seen in coronary occlusion is reported and emphasis placed upon the fact that such waves should not be classed as coronary T-waves because they not infrequently occur in conditions other than coronary occlusion.

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EXPERIMENTAL BLASTOMYCOSIS*

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and
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The work reported in this paper was undertaken in the hope of establishing some correlation between strains of blastomycetes isolated from cutaneous and systemic types of human infections, virulence for laboratory animals as influenced by dosage and method of inoculation, and pathology produced. Rabbits, guinea pigs, and white rats were given measured amounts of seven strains of blastomycetes and one of commercial yeast (Fleischmann's) by intravenous and intraperitoneal routes. If the animal died within a period of three months, gross and microscopic examinations of the tissues were made and the data charted and compared.

The recent paper of Spring,[1] published while this work was in progress, includes a comparison of seven American strains of blastomycetes from various sources as to cultural characteristics and pathogenicity for white mice, white rats, guinea pigs and rabbits. Her results indicate a susceptibility of animals in the order named. Intraperitoneal inoculation of mice produced a generalized infection in about one-third of the animals (4 of 14), with death in approximately twenty days. These mice showed miliary lesions, and numerous organisms were found in the tissues. No histological evidences of resistance, such as giant-cell formation, endothelial hyperplasia, and fibrous tissue encapsulation were noted. The remaining animals showed localized lesions, in the testicle, at the inoculation site, and on the peritoneal surface.

Two of the 14 rats showed a generalized infection, but few organisms were found, and these were associated with a fibrous tissue and giant cell reaction. Three were negative for signs of blastomycetes and the other nine animals showed localization of infection "usually near the root of the mesentery or at isolated points elsewhere on the peritoneum."

Guinea pigs were comparatively resistant. Four of the 7 animals developed caseous tumors, usually at the root of the mesentery. Abscesses in the pancreas and the liver are recorded. One pig died at the end of one month and showed a liver abscess; one died as a result of a laboratory accident and five survived the four months period which was the time allotted for the experiment.

Four of the 7 rabbits, injected both subcutaneously into the marginal ear vein and intraperitoneally, survived the four months test period. The animals which died showed practically no blastomycetic involvement. Nodules developed at the site of subcutaneous injection in only 4 rabbits and these lesions healed spontaneously.

*Received for publication October 16, 1931.

*From the Department of Bacteriology, University of Tennessee, Pathological Institute, Memphis, Tennessee.

The results of Spring closely parallel those of the early workers whose findings are summarized in Ricketts'[2] monograph. All report variable and inconsistent pathogenicity of animals to blastomycetes. Ricketts[2] produced sporadic subcutaneous abscesses, septicemia, and lung involvement in mice, rats, guinea pigs, rabbits and dogs by various methods of inoculation, but in no case could he provoke skin lesions which resembled those of man. He emphasizes the factor of variation among strains of blastomycetes. Bowen and Wolbach[3] found white mice to be uniformly susceptible and demonstrated widespread infection in these animals, while guinea pigs and rabbits showed only localized lesions. Hamburger[4] also found white mice to be susceptible and produced subcutaneous abscesses upon intraperitoneal injection. MacLane[5] reported only occasional localized infections in animals. Stober[6] used dogs, rabbits, guinea pigs, white rats, gray rats, and white mice, and injected both pus from abscesses and pure cultures, but he states that death only occurred when cocci were present in the material inoculated.

CULTURES USED AND THEIR PREPARATION FOR ANIMAL INOCULATIONS

As stated above, seven strains of blastomycetes and one of commercial yeast were used for the animal inoculations reported here. Six of these strains were isolated by one of us* from patients presenting themselves for treatment at the Memphis General Hospital during the past eight years; the seventh strain was obtained from the American Type Culture Collection.

As shown in the table below, five of these blastomyces strains consistently assumed the hyphomycetoid form of growth; two grew in typical yeast form. There was no fixed relation between form of growth and type of human disease, since both cutaneous and systemic infections yielded hyphomycetoid and yeast cultures of blastomycetes. All strains had received the same treatment as to frequency of transplantation and selection of culture medium during the past three years. The medium,[8] previously described, was routinely used, and as a preparation for inoculation of animals the cultures were grown for two weeks upon this dextrose-maltose agar.

Preliminary inoculations of guinea pigs had proved that such animals were susceptible to blastomycetic infection, especially if the cultures were injected by the peritoneal route. The approximate lethal dose for one strain had also been determined. It was, therefore, decided to give one series of test animals an amount which would in a measure represent an overwhelming dose, and a corresponding series of animals one-tenth of such a dose in order to study pathogenicity as related to the amount injected. Accordingly, one rabbit, one guinea pig, one white rat received a suitable dosage of the ground culture[9] suspended in 1 c. c. of saline, and corresponding animals one-tenth of that amount. For convenience, these dosages will be referred to as 1 c. c. and 0.1 c. c. The rabbits were injected intravenously in the marginal ear vein; the guinea pigs and the rats intraperitoneally.

ANIMAL SUSCEPTIBILITY

As indicated in the table below, 56 per cent of the rabbits, 94 per cent of the guinea pigs, and 50 per cent of the rats died during the experimental period of 3 months. In all cases where death occurred, the animals lost weight and exhibited signs of marked toxemia.

*Isolated by Dr. I. D. Michelson.

TABLE I

HISTORIES OF BLASTOMYCETES CULTURES USED FOR ANIMAL INOCULATION

Culture	Date of Isolation	Type of Human Blastomycosis and Duration	Lesion from which Isolated	Original Growth upon Isolation	Classification [Castellani(7)]
# 4	1923	Systemic 1 year	Deep subcutaneous abscess on chest	Oidial-hyphomycetoid, culture became very dry in 1926, and when transplanted again grew in yeast form which it has retained	—
Chicago* # 2	1925	Cutaneous 2-3 years	Skin lesion on cheek	Hyphomycetoid growth	B. tulanensis
# 56	1926	Systemic 3 months	Subcutaneous abscess in right deltoid region.	Black leathery growth which later went over to white hyphomycetoid form	B. dermatitidis
# 57	1926	Systemic 8 months	Abscess on leg	Hyphomycetoid growth	B. dermatitidis
# 41	1927	Cutaneous 15 months	Skin lesion right forehead	Hyphomycetoid growth	B. tulanensis
# 23	1928	Systemic 3 months	Lung abscess at autopsy	Oidial (pomegranate) three months later went over to yeast form which it has retained	—
#673†	1928	Cutaneous	Skin lesion dorsal surface right hand	Hyphomycetoid growth	B. dermatitidis

*Obtained from the American Type Culture Collection.

†673 isolated by Dr. Ketron, Baltimore, given to A.T.C.C. by Dr. F. D. Weidmann, University of Pennsylvania.

TABLE II

SHOWING RESULTS OF ANIMAL INOCULATIONS AND SITES OF LESIONS

Culture	Animal	Dosage	Route of Inoculation	Period of survival (days)	Per Cent Loss of Weight	Type of Lesions Found in Various Organs								
						Lung	Glands	Heart	Spleen	Liver	Kidney	Pancreas	Adrenal	Testicle
	Rabbit	0.1 c. c.	I.V.	*90	0	C					C			C
		1 c. c.	I.V.	*90	0									
# 41	Guinea Pig	0.1 c. c.	I.P.	21	30	C	B	C	C	C	C		C	C
		1 c. c.	I.P.	16	30		C	C		C				
	Rat	0.1 c. c.	I.P.	20		B				AC	C			C
		1 c. c.	I.P.	18		B		C		B	C			
	Rabbit	0.1 c. c.	I.V.	*90	0									
		1 c. c.	I.V.	38	12	B		C		C				
Chicago #2	Guinea Pig	0.1 c. c.	I.P.	13	35	C	C	C		C	BC			C
		1 c. c.	I.P.	6	30	C			C					
	Rat	0.1 c. c.	I.P.	24						C	C			A
		1 c. c.	I.P.	12		C			C	A				B
	Rabbit	0.1 c. c.	I.V.	18	0	C			C	C	C			
		1 c. c.	I.V.	38	11	C		C						
# 4	Guinea Pig	0.1 c. c.	I.P.	11	40		B	C	B	C	C			C
		1 c. c.	I.P.	19	30	C	C	C	C	C		AC		C
	Rat	0.1 c. c.	I.P.	16		AB		C						C
		1 c. c.	I.P.	14		B				C				
	Rabbit	0.1 c. c.	I.V.	*90	0									
		1 c. c.	I.V.	*90	5									
# 23	Guinea Pig	0.1 c. c.	I.P.	18	30	C	C	C	C	C	C			
		1 c. c.	I.P.	*90	0									
	Rat	0.1 c. c.	I.P.	*90										
		1 c. c.	I.P.	*90										
	Rabbit	0.1 c. c.	I.V.	11	10	C	A		BC	C		C		
		1 c. c.	I.V.	28	4	C		C	C		C			
#673	Guinea Pig	0.1 c. c.	I.P.	10	25	C	A	C	B	C	C		C	C
		1 c. c.	I.P.	16	34	AC	A			C	C			
	Rat	0.1 c. c.	I.P.	*90										
		1 c. c.	I.P.	*90										
	Rabbit	0.1 c. c.	I.V.	34	8	C		C	BC	C	C			
		1 c. c.	I.V.	*90	0									
# 56	Guinea Pig	0.1 c. c.	I.P.	19	33	C	C	C	C	C				
		1 c. c.	I.P.	16	30	C	A	C		C	C	C	C	C
	Rat	0.1 c. c.	I.P.	*90										
		1 c. c.	I.P.	22						C	C			
	Rabbit	0.1 c. c.	I.V.	*90	0	C								
		1 c. c.	I.V.	41	10	C					C			
# 57	Guinea Pig	0.1 c. c.	I.P.	6	25	C	A		C	C	C			C
		1 c. c.	I.P.	4	10	C			BC			C		
	Rat	0.1 c. c.	I.P.	*90										
		1 c. c.	I.P.	*90										
	Rabbit	0.1 c. c.	I.V.	38	9	C								
		1 c. c.	I.V.	39	6									
Fleischmann yeast	Guinea Pig	0.1 c. c.	I.P.	9	23	B		C		C				BC
		1 c. c.	I.P.	11	10	B		C		C	BC	C		
	Rat	0.1 c. c.	I.P.	18		C				C	C			
		1 c. c.	I.P.	*90										

*Less than ninety days.

A rather surprising susceptibility of rabbits to blastomycetes was demonstrated since only 7 of the 16 survived. Of these 7 animals only 1 lost sufficient weight to be recorded and that amount, 5 per cent, was not considered significant. The 9 rabbits whose infection terminated fatally lived for periods varying from 11 to 41 days with the average 31.6 days. The loss of weight varied from 4 to 12 per cent with 7.7 per cent representing the average loss. No correlation between the duration of life and loss of weight was evident.

Guinea pigs were the most susceptible of the animals used and 15 of the 16 pigs died within the experimental period. These animals showed little resistance to the infecting dose and succumbed after periods ranging from 4 to 21 days. As might be predicted, the short period of survival was accompanied by marked loss of weight, varying from 10 to 40 per cent with an average of 27 per cent. With the guinea pigs a definite correlation between duration of life and loss of weight was demonstrated, since the pigs dying within a week after inoculation showed the greatest relative loss of weight.

Definite figures regarding the loss of weight as related to the duration of life in the case of rats are not available. These animals became very emaciated and 18 days represented the average period of survival after injection of the blastomyces cultures.

STRAIN PATHOGENICITY

A rather marked variation in strain pathogenicity was demonstrated. One strain (4) produced death of all 6 of the animals injected; 2 strains (*Fleischmann's yeast and Chicago 2) killed 5 of the 6 animals receiving experimental doses; 3 strains (41, 673, and 56) proved fatal to 4 of the 6 animals; 1 strain (57) was virulent for 3 of the 6 animals, and the remaining strain (23) produced death in only 1 of the 6 animals injected.

Rabbits were susceptible to strains 4, Fleischmann's yeast, Chicago 2, 673, 56, 57; guinea pigs to all strains, and rats to strains 4, Fleischmann's yeast, Chicago 2, 41, 56.

It is an interesting observation that the strain 4 proving fatal to all animals was the oldest strain, having been isolated from a patient dying of systemic blastomycosis eight years ago.

*For the sake of comparison, Fleischmann's yeast is not differentiated from the true blastomyces strains.

EFFECT OF SIZE OF DOSAGE ON PATHOGENICITY

If death or survival of the animal is accepted as the criterion for evaluating the effect of size of dosage on pathogenicity, it would seem that this factor was of little importance. In practically all cases injection of animals with 0.1 c. c. and 1 c. c. doses produced the same results, i. e., both animals died, or both animals survived. Injection of rabbits with 0.1 c. c. of cultures Chicago 2 and 57, and of rats with 0.1 c. c. of culture 56 and Fleischmann's yeast failed to produce death, while the 1 c. c. amount of these cultures killed the corresponding animals, thus suggesting the significance of dosage. However, the guinea pig receiving 1 c. c. of culture 23 survived as did the rabbit receiving 1 c. c. of 56, while the corresponding animals which received only 0.1 c. c. of these cultures died within the experimental period. Again it was observed that in cases where both animals died the duration of life was sometimes greater for the one which had received 1 c. c. than for the one which had been injected with the smaller amount.

No conclusions may be drawn from the results presented. In every case the factor of individual animal resistance or susceptibility must be accepted along with the variation in virulence of strains.

DESCRIPTION OF LESIONS

In general, the pathological findings were inconsistent. Careful survey of the data obtained from histological studies, however, divided the lesions into three rather well defined groups, and the following classification was used in evaluating the results.

Type A Lesions.—This lesion represented the most marked pathology found and was characterized by its progressive nature and the presence of organisms. It was essentially a granuloma with a well defined central area of necrosis surrounded by three distinct zones: an immediate zone containing many giant cells, mononuclears, some lymphocytes, and organisms; a second zone made up of young fibroblasts with an occasional mononuclear wandering cell; and an outer region of mature connective tissue (*Figs. 1* and *2*).

The degree of necrosis varied from the stage of karyorrhexis and pyknosis to actual digestion and fluidification of the tissue, with nuclear dusting as the most frequent picture. Remains of polymorphonuclear leucocytes were occasionally noted, but with the exception of one case to be described later, cell detail could not be

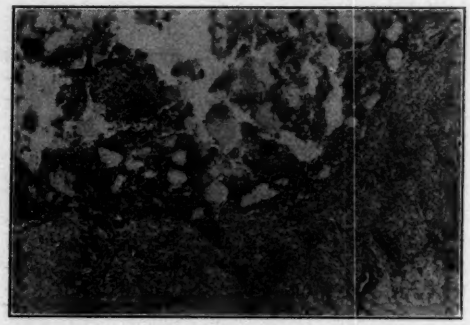

Fig. 1
Lymph node from guinea pig showing Type A lesion with its 3 zones: (1) central area of necrosis in a state of liquefaction; (2) surrounding zone of many giant cells and mononuclear wandering cells; (3) external fibrous tissue wall (X 32).

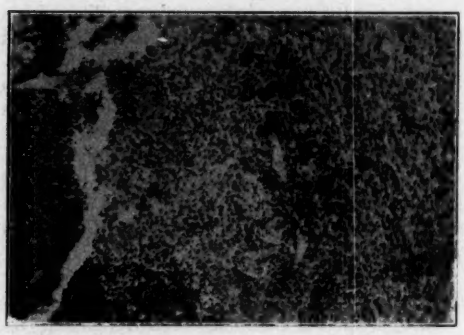

Fig. 2
Lymph node from guinea pig showing Type A lesion under a higher magnification. Pyknosis and karyorrhexis are marked in the central zone. Langhans giant cells are numerous in zone 2 (X 96).

discerned. No organisms were found in this region.

The zone immediately surrounding the necrotic area contained giant cells in such abundance as to render this finding a possible means of differentiation from lesions produced by other etiological agents. The giant cells of the foreign body type predominated, though the Langhans variety was frequently encountered. The occurrence of these two types of giant cells in the same microscopic field was considered unusual. Blastomycetes were numerous in this zone and were demonstrated with greater ease than in human lesions. They occurred singly, the outer capsule was but poorly developed, and budding forms were encountered in only 1 animal of the entire series. The various morphological changes found in the organisms will be described later. The blastomycetes were found either within or in close proximity to the giant cells. Areas were also noted with numerous giant cells, but no organisms. The mononuclear wandering cell constituted the next most important cellular element. They were large, round or oval, with leptochromatic nuclei and presented evidences of ameboid and at times phagocytic activity.

Only the outermost portion of this Type A lesion was vascular, which offers a possible explanation for the area of central necrosis. The direct action of the organisms on the tissues deserves consideration since nothing is known concerning toxins of blastomyces. The progression of the lesions must be assumed to occur either by fusion of multiple discrete units or by the extension from the central necrotic area in various directions, forming in either case a mulberry-like mass in which the three zones could be clearly made out. Occasionally organisms were found in the depths of the mononuclear or capsular zone initiating the above microscopic picture.

These findings were most frequently encountered in the lymph nodes of guinea pigs which showed grossly, marked enlargement, caseation or pus formation, and at times hyperplasia plus raised white or yellowish opaque areas varying from 3-30 mm. in size. On the other hand, many lesions were found only upon microscopic examination. Extensive blastomycosis as seen in man and exemplified by dermal verrucose lesions with miliary abscesses at the borders, or generalized blastomycosis with pneumonic involvement and disseminating fluctuating abscesses was never reproduced in animals. Similarly, the polymorphonuclear leucocytes which play such an important role in human infections were present only in small numbers in the lesions of experimental animals.

Type B Lesions.—Any lesion, exudative or proliferative in nature, with associated organisms, but lacking the extensive necrosis described for *Type A* was classified as *Type B*. It is obvious that the above definition permits the inclusion of lesions of wide diversity. In the exudative type were found fibrin, polymorphonuclear leucocytes, mononuclear cells, eosinophils and lymphocytes in various combinations and varying quantities. In the proliferative reaction the mononuclear cells and the lymphocytes played the dominant role. Only an occasional well-defined giant cell of the foreign body type could be demonstrated, but their formation in some of the lesions was suggested. Necrosis was either very slight in extent or absent. The or-

ganisms were always scarce in this type of lesion and were only demonstrated after prolonged search. They were poorly preserved and recognition depended upon a familiarity with the appearance of blastomyces in their various forms. Differentiation from artifacts simulating organisms was sometimes difficult, and special staining methods are recommended. It is to be emphasized, however, that the same pathological picture, but without the presence of organisms frequently occurred. In direct contrast to this preponderance of cells as compared to organisms blastomyces were found in certain tissues (spleen and liver) with a complete absence of cellular reaction, or at most a very slight infiltration of mononuclears or lymphocytes. These *Type B* lesions occurred infrequently and the relative paucity of the organisms suggests the difficulties encountered in establishing a progressive generalized infection in animals. It is apparent that no gross description can be given of tissues with this type of lesion.

Type C Lesions.—*Type C* lesions included all gross and microscopic deviations from normal in which blastomyces were not demonstrable. Obviously, this group included changes incident to febrile conditions such as parenchymatous and fatty degeneration of the visceral organs, splenic tumor and focal mononuclear infiltration of the myocardium and liver. Closely related changes as active dilatation of the blood vessels, endarteritis, hemorrhages in various organs, hyperplasia of the lymph nodes, pneumonic changes, varying in intensity from dilatation of the capillaries with the outpouring of serum into the alveoli to the presence of extensive lymphatic and mononuclear infiltration were also placed in this group. Many lesions suggestive of *Type A* in the stage of healing, but showing no organisms after prolonged search, were so classified.

ORGAN SUSCEPTIBILITY

Lungs.—*Type A* lesions were found in the lungs of only one guinea pig and one rat. No such lesions were demonstrated in rabbits even though they received intravenous inoculations, the most favorable route for the production of pneumonic involvement. Seven of the animals, four rats, two guinea pigs and one rabbit, showed *Type B* lesions.

In the remaining animals was found bronchopneumonia of varying severity in which red blood cell exudation into the alveoli played a conspicuous part. The white blood cells were chiefly of the lymphocytic variety with a smaller proportion of mononuclear wandering and spindle-shaped cells. Perivascular and peribronchial infiltration with lymphocytes was a rather common finding, especially in the guinea pig series. Polymorphonuclear neutrophils were usually absent, but polymorphonuclear eosinophils were numerous in some of the sections. Whether these lesions represent terminal infections, manifestations of blastomycetic toxins, or allergic responses must be proved (*Fig. 3*).

Liver.—Two rats showed *Type A* lesions in the livers upon microscopical examination, while only one *Type B* lesion, also in a rat, was found. In one of the former the lesions were at the periphery of the liver, indicating that infection resulted from peritoneal drainage. The *Type C* group commonly showed cloudy swelling and congestion. Periportal infiltration with lymphocytes and diffuse areas of focal necrosis were sometimes encountered. Several of the guinea pigs showed a perihepatitis in the stage of healing. Grossly, cloudy swelling was the usual finding.

Kidney.—No *Type A* lesions were seen and only 2 *Type B* lesions, one in a guinea pig, the other in a rabbit. Parenchymatous and fatty degeneration and congestion were present in the remaining animals. In the guinea pigs cortical areas of mononuclear infiltration were also found.

Spleen.—No *Type A* and 5 *Type B* lesions were found, 3 in guinea pigs and 2 in rabbits. In the other group, a most noteworthy but infrequent lesion was a peculiar tubercle-like structure made up of large mononuclear cells. Hyperplastic splenitis affecting chiefly the sinuses and pulp, with marked evidence of phagocytosis of red blood cells was the usual pic-

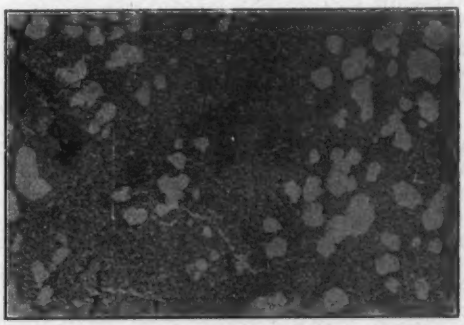

Fig. 3

Lung from guinea pig showing the hemorrhagic bronchopneumonia which was a consistent finding in all animals dying during the experimental period. Focal accumulations of mononuclear cells are also shown (X 32).

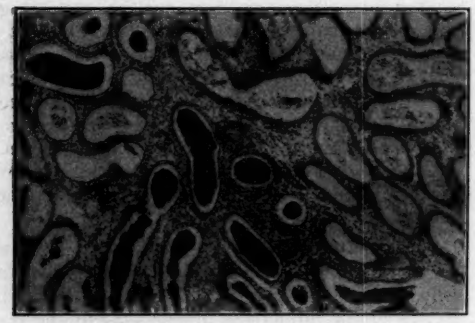

Fig. 4

Testicle from guinea pig showing intertubular infiltration by fibroblasts and mononuclear cells with derangement of spermatogenesis (X 32).

ture. These lesions were most pronounced in the spleens of guinea pigs.

Heart.—Microscopic examination failed to disclose any *Type A* or *B* lesions. Cloudy swelling, perivascular or irregularly distributed accumulations of lymphocytes comprised the usual findings in the *Type C* lesions. Active hyperemia and endarteritis were less frequently encountered. Again these changes were most marked in guinea pigs.

Pancreas.—One guinea pig showed a *Type A* lesion. In reality, this was an encapsulated abscess firmly bound to the pancreas by a thick layer of connective tissue. There were no *Type B* or *C* lesions.

Adrenal.—There were no *Type A* or *B* lesions. *Type C* lesions in rabbits and rats were inconspicuous. However, in guinea pigs, periadrenalitis with necrosis, lymphocytes, mononuclear wandering cells and fibroblasts were frequently observed, as was dilatation of the capillaries or hemorrhage with compression necrosis of the cords.

Testicles.—Only one *Type A* lesion in a rat and 2 *Type B* lesions, one in a guinea pig and one in a rat, were found. The *Type A* lesion merits especial description, since it represents the most extensive tissue involvement occurring in our series. A cauliflower mass, measuring 5 cm. in diameter, with a red, raw beef-like surface surrounded the genital opening. The microscopic picture varied from the one accepted for the *Type A* lesion in the great number of organisms found and the complete absence of giant cells. The organisms showed well developed capsules and budding forms were numerous. This was the only tissue in which budding forms were found.

The majority of the *Type C* lesions occurred in guinea pigs and consisted of one or a combination of the following changes: dilatation of or hemorrhage from a plexus of blood vessels adjacent to the vas deferens, infiltration of the epididymis and tunica vaginalis with lymphocytes, mononuclear cells and fluid, and dilatation of the blood vessels. The infiltration of the testes proper was slight; spermatogenesis was always greatly disturbed, although complete cessation occurred in only 2 animals showing fibrosis (*Fig. 4*).

Lymph Nodes.—The lymph nodes showed 4 *Type A*, 2 *Type B*, and 8 *Type C* lesions. Thirteen of these *A* and *B* lesions occurred in guinea pigs and one *Type C* lesion in a rabbit. Cortical involvement, proceeding in some cases

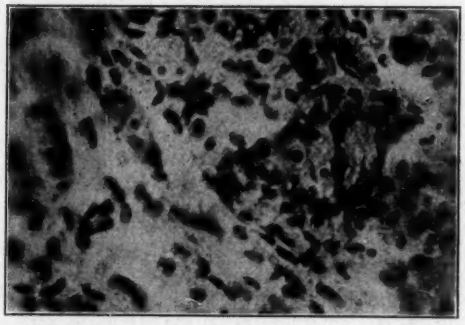

Fig. 5

Lymph node from guinea pig showing well developed giant cells and blastomyces. The outer capsular walls of the organisms are sharply defined in contrast to the internal structure (X 360).

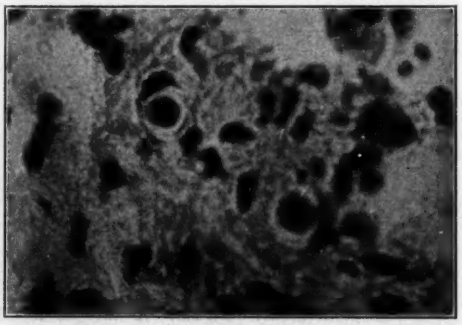

Fig. 6

Organisms from section shown in Fig. 5 under higher magnification to bring out details of internal structure. The pear shape is apparently due to distortion in fixation since the unstained organisms are perfectly round (X 740).

to lymphadenitis, was the usual picture in the *Type A* and *B* groups. The lymph nodes at the root of the mesentery were most frequently affected, although occasionally the right, or both inguinal nodes were involved. Grossly, the picture was that of hyperplastic lymphadenitis, the necrosis and the abscesses being microscopic in size. The *Type C* lesions consisted of hyperplastic lymphadenitis, affecting chiefly the germinal centers.

DESCRIPTION OF ORGANISMS

The blastomycetes encountered were smaller and in a poorer state of preservation than those found in human lesions. As previously stated, budding forms, always present in human diseased parts, were demonstrated in only one animal lesion. The capsules, especially the outer ones, were poorly defined, and stained with difficulty. The cytoplasm contained 1 or 2 vacuoles which, as the organism enlarged, tended to occupy the entire cell. Shadow or shell forms were very numerous, and some giant cells contained round empty spaces very suggestive of remains of blastomyces. Nuclear material was difficult to demonstrate (*Figs. 5* and *6*).

A large tangled mass of mycelia with a few round forms was found in the lymph nodes of 2 guinea pigs. These organisms did not stain by the hematoxylin and eosin method, were highly refractile and the internal structure was not discernible. This finding is of unusual interest, for although atypical small round forms have been described[10] the mycelial stage has not been recorded in human or animal lesions. In both instances, the animals had received the mycelial form of culture. The question arises as to whether the mycelia found in these nodes were the organisms originally introduced or new mycelia derived from converted budding forms, since their size excludes the possibility of transportation to the nodes by phagocytic cells.

SUMMARY

(1) Inoculation of 16 rabbits (intravenously), 16 guinea pigs and 16 rats (intraperitoneally), with 7 strains of blastomyces and one of commercial yeast (Fleischmann's), produced death of 9 rabbits, 15 guinea pigs and 8 rats within the experimental period of three months.

(2) No lesions of a progressive disseminated nature were demonstrated.

(3) The marked loss of weight and signs of severe toxemia, especially in rats and guinea pigs, suggested the possible role of toxins in producing death of the animals, though the pathological conditions found indicated well developed local resistance.

(4) The scarcity of organisms with the almost total lack of budding forms; the presence of numerous giant cells, and few polymorphonuclear leucocytes, offered histological evidences of resistance and chronicity in animals as contrasted with the picture of acute exudation on a chronic proliferative background of human lesions.

(5) The mycelial forms of blastomycetes were found in 2 animal lesions. They were characterized by their failure to stain and their inability to produce necrosis in the adjacent tissues.

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HOARSENESS: A DANGER SIGNAL*

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The term hoarseness denotes any voice variation from the normal, in tone or force. It may range from a slight huskiness to inability to raise the voice above a whisper.

The patient is conscious of a strange harsh sound in his own voice. It is the chief symptom in a disease so common and transitory as an acute laryngitis, and is for a long time the only symptom in diseases so frequently fatal as cancer and tuberculosis of the larynx. Because the public has not been educated to the gravity of the diseases which hoarseness may usher in, and because hoarseness is for a long time unaccompanied by pain, patients will often go on for weeks and months in the belief that they are suffering from a cold, which will heal spontaneously. After waiting a considerable length of time, and after failure of the voice to regain its normal sound, they will finally consult the family physician. Because a laryngeal examination is at times difficult, or an expert laryngologist

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

is not easily accessible, and because an acute or chronic laryngitis is the most frequent cause of hoarseness, many physicians lull the patient into a false sense of security and dismiss him with a prescription for a gargle. And if the cause of hoarseness is a serious disease, the process is far advanced when the patient reaches a competent laryngologist. Therefore, I think that one of the responsibilities of the laryngologist is the task of educating the general practitioner and the public, so that no human being may be continuously hoarse for any length of time without getting an expert opinion regarding its cause.

I shall illustrate with reports of cases the various conditions which should be thought of when a patient comes to the office complaining of hoarseness.

TRAUMATIC HOARSENESS

The youngest child we examined for hoarseness was a baby three days old. The mother noticed on the second day that the baby had difficulty in breathing and sounded hoarse when she cried. Direct laryngoscopy showed a paralysis of the left vocal cord. It remained in the cadaveric position in inspiration and expiration. The voice began to improve in two weeks and became normal in about six weeks. This may have been caused by traumatism during delivery.

ENLARGED THYMUS

We have within the last two years examined six babies, the youngest six weeks old, and the oldest one and one-half years, with the history of cough, husky voice and dyspnea. The progressive dyspnea brought them to the physician. In four of these cases, bronchoscopy demonstrated a flattening of the anterior wall of the trachea, suggestive of pressure. Roentgenograms demonstrated large thymus glands in all cases. Three cases recovered under x-ray treatment. Two were lost sight of. One child died. This child was treated by a competent roentgenologist until a roentgenogram showed disappearance of the thymus; the dyspnea continued, convulsions developing during attacks of severe dyspnea, and the child died. Autopsy revealed a large thymus very low. In babies with hoarseness, the possibility of an enlarged thymus should be kept in mind, and treatment instituted before the development of dyspnea.

PAPILLOMA OF THE LARYNX

M. T., age 5, on July 17, 1927, was brought to the office. The history was as follows: he had been somewhat hoarse since he was eighteen months old; the hoarseness gradually progressed until he could speak only in a whisper. About a year previously he began suffering with dyspnea, which had gotten progressively worse, till for the preceding few weeks he had been unable to sleep. As soon as he fell asleep he turned blue and woke up choking. Examination revealed an undernourished child, hardly able to speak and breathing with difficulty. Indirect laryngoscopy showed a papillomatous mass filling up the glottis, attached mainly to the left cord. On July 21, 1927, I attempted to remove the mass without general anesthesia. The child was given 1/16 morphine, and 1/300 of atropine. As soon as the laryngoscope was introduced, the child turned blue and stopped breathing. The administration of oxygen restored respiration and improved his color. A preliminary tracheotomy was then performed, under ethylene anesthesia, and afterward ether was given through the tracheotomy tube. Through the old Seifert instrument, the growth was removed with biting forceps, and its base cauterized. He was decannulated on the twelfth day, and to date, over three years since the operation, there has been no recurrence. Two years after the operation we removed his tonsils, and a laryngoscopy showed that the larynx was clear.

Sections from the tumor showed small cores of connective tissue covered by many layers of squamous epithelium. There was no evidence of malignancy (*Figure 1*).

This is an unusual course for papilloma of the larynx. This type of growth is most frequently found in young children, and is sometimes congenital. It may arise from the vocal cords or from any part of the mucous membrane of the epiglottis, larynx and trachea. Microscopically, the outer layers of epithelium vary from the squamous, with a horny layer on the surface, to

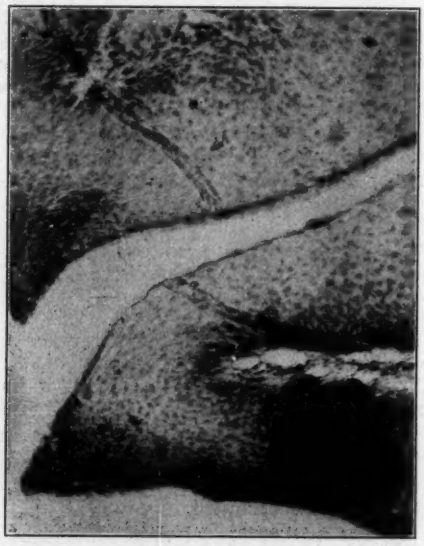


Fig. 1
Simple papilloma, connective tissue core covered with layers of squamous epithelium.

the columnar, and they may be of any thickness. The size and arrangement of the cells, the appearance of the nuclei, the presence of a basement membrane, and the absence of invasion into the central connective tissue classify this growth with benign neoplasms. In spite of this, the mortality rate in children under five is greater than in carcinoma of the larynx in adults. Many patients are reported to have died of suffocation before medical aid could reach them. In addition, there is danger of a sudden fatal inhibiting reflex. This is the most common type of new growths in children. It is fortunately a rare disease, statistics quoting an occurrence of 0.1 per cent in children under fourteen. It may appear at any age, and one-fifth of the cases are, according to Gerhardt, congenital. Boys are more frequently affected than girls. The most characteristic feature of this growth is its rapid recurrence after removal, and its tendency to implant itself on an abrasion of the mucous membrane anywhere in the larynx, made during an operation for its removal. In this respect it resembles papilloma of the bladder. Nearly all cases require tracheotomy and a long series of treatments before respiration through the normal passages is re-established. In performing the tracheotomy, it is of the greatest advantage to the child to be able to do the tracheotomy carefully and deliberately. Since the tube usually has to be worn for a considerable length of time, an emergency tracheotomy not carefully performed is likely to result in laryngeal stenosis, which is very difficult to correct. The importance of early diagnosis in these cases can hardly be overestimated.

I am reporting another case of the same disease, because it was quite different in its course.

June 27, 1927, J. C. McD., age 3 years, male, colored, was seen. This is a case of papilloma more typical in its behavior. He came with the history of progressive hoarseness and dyspnea since infancy, which had become worse in the previous year. There was a septic temperature, the highest 100°, July 2, 1927. The x-ray showed an enlarged thymus. Direct laryngoscopy showed papillomatous masses filling up the larynx; they were removed under morphine and atropine analgesia, with biting forceps and cautery. His respiration and voice improved considerably, and he was sent home, with instructions to return for further observation. The patient returned August 13, 1927, with a recurrence. The polyps again filled the entire larynx. The operation was repeated. September 6, 1927, we removed his tonsils and adenoids under general anesthesia, and as soon as the operation was over we introduced the Kahler-Leiter bronchoscope and examined the larynx thoroughly. This was the first time he was examined under general anesthesia, and as far as we could tell, his larynx was free of any papillomatous masses. This examination was almost four weeks after the last operation. He came back again September 25, 1928, complaining of severe dyspnea, so severe as to require an emergency tracheotomy. This was done under local anesthesia. The child had a series of convulsions on the operating table, lasting over an hour. He finally rallied, and seemed to be doing well for a few hours, when he died suddenly ten hours after the operation, from respiratory failure. Autopsy showed the larynx full of polyps. A large mass arising from the right arytenoid filled the interarytenoid space; the right ventricular fold was entirely obliterated and replaced by papillomas; the true cord was not involved. On the left side, the ventricular fold, the ventricle and the vocal cord were replaced by a mass of papillomatous tissue. Most of the undersurface of the epiglottis was studded with papillomas; the pyriform fossa on the right side was extensively involved, one papilloma was in the subglottic region, and one was in the beginning of the esophagus (*Figure 2*). It is obvious that no surgery could completely remove these growths. Autopsy showed also a very large thymus weighing over 11 grams. The brain was very red and congested, and there were small hemorrhages in the pia mater. The four previous times the boy was in the hospital, he had a septic temperature, and a systolic murmur transmitted to the aortic region. His white blood count every time was from 6000 to 8000 and highest polymorphonuclear count 66 to 68 per cent. The white blood count before he died was 22,000 and his polymorphonuclear 79 per cent. Dr. Braun, the pathologist at the Jefferson Davis hospital, could find no definite pathological condition in the autopsy to account for the final leucocytosis.

Section from a specimen taken during life shows small cores of connective tissue containing a few cellular elements and covered by a very thick layer of stratified squamous epithelium. No evidence of malignant changes was seen (*Figure 3*).

Fig. 2
Drawing from autopsy specimen, widespread distribution of pa illomas.

Fig. 3
Simple papilloma, connective tissue cores covered with a thick layer of squamous epithelium.

SINGER'S NODES

Mrs. M. K., age 24, came complaining of loss of voice, with a history of intermittent hoarseness since she was ten years of age. Laryngoscopy showed that she had a node at the junction of the anterior and middle third of each cord opposite one another. They were cauterized August 22, 1925. When she was last seen, six months later, her voice was normal.

Singer's nodes are small, sharply defined, yellow or gray symmetrical sessile thickenings on the edges of the vocal cords, usually situated at the junction of the anterior and middle thirds. They are smooth and sessile, while papillomas are rough, projecting and pedunculated. Pathologically, they are characterized by a diminution or absence of elastic fibres, permanent distension of blood vessels, thrombosis, extravasation of blood, and fibroplastic thickening. They occur in people who abuse their voices, as actors, singers, or preachers. Their only symptom is hoarseness.

FIBROANGIOMA

Mr. A. C. L., age 31, has been treated for hoarseness for over a year with local applications. Examination showed a bead-like growth, red, shiny and smooth, attached by a pedicle to the anterior portion of the right vocal cord.

September 19, 1927, with the Haslinger directoscope and a cup-shaped forcep, the growth was removed. It was the size of a small pea. The base was cauterized with the electrocautery. He made an uneventful recovery of his voice. We examined him in 1930 and there was no sign of any recurrence.

Sections show areas of dense fibrous tissue containing very few cellular elements, interspersed with large blood spaces (*Figure 4*).

INFLAMED AND ULCERATED PAPILLOMA

T. Y., age 55, came complaining of hoarseness and dyspnea, especially marked at night. With the Seifert suspension laryngoscope, a large bleeding polypoid mass, originating from the right arytenoid and filling the interarytenoid space, was removed. Here the age of the patient, and the bleeding, suggested malignancy.

Section shows a core of connective tissue covered in part by a thick layer of stratified squamous epithelium. The connective tissue core shows a marked inflammatory reaction with erosion of epithelium in places (*Figure 5*).

MYXOPAPILLOMA OF THE LARYNX

August 9, 1928, J. H., age 19, complained only of hoarseness of a month's standing. Indirect laryngoscopy showed a small pale, irregular mass on the under surface of the left cord close to the anterior commissure.

Under local and direct laryngoscopy we removed part of the tumor and cauterized the rest. This was done with great difficulty. The larynx had to be stretched considerably to get an exposure of the anterior commissure, which is not easy under local anesthesia.

Section showed a definite myxomatous tissue with some cellular inflammatory reaction (*Figure 6*).

Here is another case of papilloma of the larynx

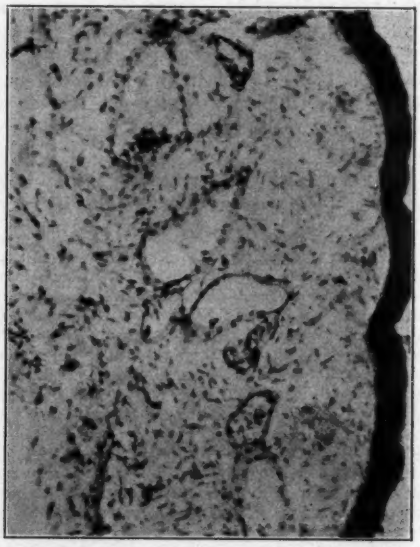


Fig. 4
Fibroangioma. Dense fibrous tissue with few cellular elements and large blood spaces.

Fig. 5
Inflamed, ulcerated and bleeding papilloma. Thick layer of squamous epithelium, with erosion near right margin. Fibrous tissue shows inflammatory reaction.

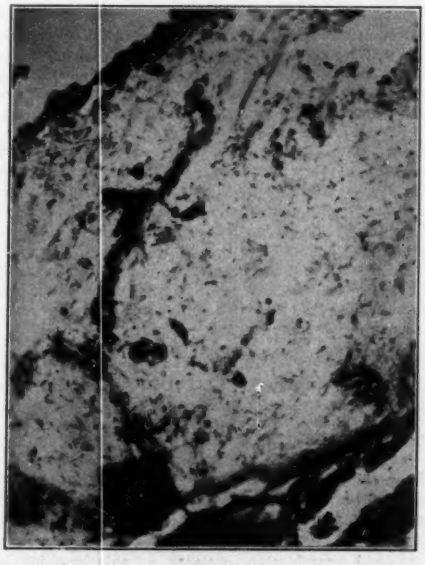


Fig. 6
Myxo-papilloma. Myxomatous tissue with some cellular inflammatory reaction.

in an adult, to illustrate that these are fairly common cases.

Miss A. D., 23 years, has been hoarse since childhood, and for the last year her voice was reduced to a whisper. She had her tonsils and adenoids removed in the hope of improving her voice, but without benefit Laryngeal examination showed thickened vocal cords, with a scalloped effect at the edges. These tongue-like projections could be seen rising and falling and interfering with the approximation of the cords. On June 11, 1924, under direct laryngoscopy these polypoid projections were bitten off, and the cords smoothed with electrocautery. The specimen was sent to the laboratory, and the following report came back: two small pieces grossly resemble papilloma; sections show a small core of connective tissue covered with a layer of squamous epithelium.

The patient came back two months later, with the voice considerably stronger; on the anterior third of the right cord there was one of these tooth-like projections, and this was removed August 12, 1924. December 10, 1924, her left cord was again smoothed with the electrocautery. She has a strong, though somewhat hoarse voice, and has been teaching since.

In contradistinction to these benign tumors of the larynx are the malignant tumors, in which an early diagnosis and prompt removal is essential to avoid a fatal outcome.

EPITHELIOMA

Mr. A. K., 70 years old, came complaining of hoarseness of two months' duration. He had what appeared to be a papilloma of the right vocal cord. He was advised to have it removed, and had it done by another laryngologist. He returned four years later, July 14, 1924, again complaining of hoarseness, and suggesting himself that his growth had recurred. The laryngoscopic mirror showed a bleeding cauliflower growth occupying the anterior two-thirds of the right vocal cord (*Figure 7A*). The arytenoid movements were not impaired. A tentative diagnosis of a degenerating papilloma was made, and he was advised to have it removed. Shortly afterward he contracted dengue and lost twenty pounds. When he returned September 10, 1924, he looked so ill that he was sent to an internist for examination for tuberculosis. This, as well as a Wassermann test, was negative. September 12, 1924, the growth was

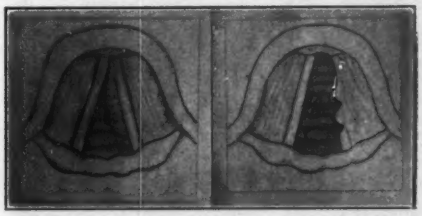


Fig. 7 (a)
Epithelioma.

Fig. 7 (b)
One year after operation.

removed under local anesthesia by direct laryngoscopy. The specimen was sent to the laboratory.

Sections show many cords of squamous epithelium separated by dense fibrous tissue. Some areas show groups of squamous epithelium arranged in concentric whorls, similar to "pearly bodies" of skin epitheliomata (*Figure 8*).

Because there was no glandular enlargement of the neck, the vocal cords were not fixed, and the arytenoids were not involved, the growth was considered intrinsic, and a good result expected from the laryngofissure. September 24, 1924, we did a laryngofissure, after a preliminary tracheotomy under local anesthesia, at the same sitting. When the larynx was opened, the growth was found to be much larger than it appeared before. It bled profusely; the growth with an extensive margin of normal tissue around it was removed, and this was followed by the electrocautery. The larynx had to be packed; the packing remained there 48 hours. When the packing was removed, a 25 mg. radium capsule was introduced into the wound and remained there for 48 hours. The patient made a stormy recovery, being very weak and feeble, the wound discharging a great deal, and he had great difficulty in swallowing without exciting a coughing spell. He recovered and the tracheotomy tube was removed October 11, 1924. Four weeks after the operation a small sequestrum of cartilage came out through the fistula, which remained in the larynx. This was probably due to the devitalization of the cartilage with the electrocautery, or radium. The fistula became much smaller after this, but there still remained an opening. March 15, 1925, the fistula was closed by a Passow sliding flap operation. About a year later he gained twenty pounds, and has since been following his vocation as a barber. His voice is strong and distinct, but husky. A fibrous band is partially replacing the original vocal cord (*Figure 7B*). He was followed for five years and there was no recurrence.

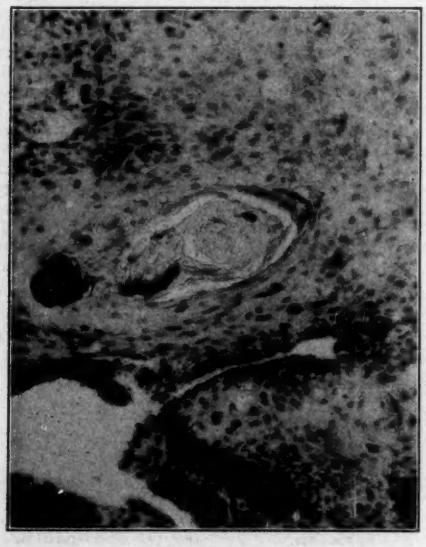


Fig. 8
Epithelioma, malignant epithelium and large pearly body.

Cancer of the larynx is not a rare disease, and Tucker says that in intrinsic cancers an early diagnosis offers a cure in 70-80 per cent of cases, which is a much higher percentage than can be secured in any other part of the body. The lymphatics of the larynx form a network of their own, which does not anastomose with the neighboring lymphatics. This poor lymphatic drainage explains the comparatively late metastasis, and makes possible the high rate of cure. Most of these tumors are epitheliomas, arising from the true cords, which are covered with squamous epithelium. They rarely occur under 40 years of age, and their symptoms for a long time are only hoarseness. They usually originate from the middle and anterior part of the larynx. According to Lynch, they scarcely ever arise from the posterior third of the larynx. As stated above, intrinsic cancers offer a good prognosis, when removed by laryngofissure. When the cartilagenous part of the larynx is invaded, as determined by fixation of the arytenoids and interference in mobility, a complete removal of the larynx is required. When the glands in the neck and mediastinum are enlarged, the prognosis is practically hopeless.

Such a case was Mr. D. H., 70. He came complaining of hoarseness and beginning dyspnea; the hoarseness was of two years' duration, during which time he consulted two or three times a physician in the country at a few months' intervals, and was given a prescription. The larynx had a growth in its middle third of the right cord, and the lymph nodes in the neck were swollen. He was obviously not an operative case at this stage. Radium needles were introduced into the growth, and radium applied externally over the glands. The growth in the larynx vanished remarkably, only to come back with greater activity three months later. He had more radium, required a tracheotomy for dyspnea, and lived about one and one-half year with a tracheal tube, and finally after two years of treatment died from a severe hemorrhage.

Tuberculosis of the larynx is another disease where early diagnosis greatly augments the chances of recovery.

May 5, 1928, Miss E. B., age 28 years, was seen. She had been hoarse for one month, had had a cold and cough at intervals for three months. She consulted two physicians, one before she became hoarse and the other after. Both assured her, after a physical examination, that her lungs were all right.

Laryngeal examination revealed granulations in the interarytenoid fold and some under the posterior ends of the vocal cords. The arytenoids were slightly edematous. We made a diagnosis of laryngeal tuberculosis. She was told to have her sputum examined in a labora-

tory; a few tubercle bacilli were found; subsequently, an internist, on physical examination, found involvement of the right apex.

May 26, 1928, in the office under local anesthesia, using the Hoslinger directoscope, we cauterized the granulations superficially and made three deep punctures, one in the interarytenoid space and one in each arytenoid. She came back July 17, 1928, having gained over twenty pounds. Her larynx was practically healed except for two small granulations, one in the interarytenoid space and the other on the right side near the posterior edge of the cord. The vocal cords remained widely separated, even during extreme phonation. Evidently there had been some infiltration in the cartilages, which had caused a permanent partial fixation of cords, and her voice may never improve. Within two years she had recovered also from her pulmonary conditions.

I am referring here to a case, which I have reported in the *Laryngoscope*, because it is unusual to find so serious a condition in a man apparently well.

Mr. A. G., age 45, a well-developed man, apparently in good health, because he was in the city with a sick wife, took advantage of the opportunity to see about his hoarseness of a month's duration. He did not consider it of sufficient importance to have made the trip simply for himself. On examination he was found to have both pulmonary and laryngeal tuberculosis. There were two ulcers on the epiglottis, the arytenoids were infiltrated and swollen, and the vocal cords ulcerated. Here was a fairly advanced case of laryngeal tuberculosis, without sufficient discomfort to make him seek relief. He had, besides, pulmonary tuberculosis with a cavity in the right apex, and active foci in the left upper lobe of the apex. His larynx was cauterized with the galvanocautery October 26, 1927. Under proper constitutional treatment his process was completely arrested when he was re-examined January 27, 1928.

According to St. Clair Thompson, the larynx is involved in 4.8 per cent of early pulmonary tuberculosis, and nearly 50 per cent of advanced cases. The favorite site of tuberculous laryngitis is the interarytenoid space, the anterior surface of the arytenoid body, and the vocal processes. The vocal cords are attacked next, and the region in the anterior commissure and epiglottis are generally attacked late in the disease. Laryngeal involvement is a serious complication of a case of pulmonary tuberculosis; it makes the prognosis worse, and lengthens the time of treatment considerably. Contrary to the teaching of a generation ago that tuberculosis of the larynx was a herald of death, we know now that early laryngeal tuberculosis is quite amenable to treatment.

St. Clair Thompson says that the larynx may heal, while the pulmonary condition progresses, but if the laryngeal condition is progressive it is a definite sign of advancement of the disease in the lungs. In early laryngeal lesions the percentage of cures is given as one in every four patients. The number could be considerably increased were laryngoscopic examinations made more frequently and the disease diagnosed earlier. The treatment in addition to general measures and vocal rest is now confined almost entirely to the electrocautery.

SYPHILIS AND TUBERCULOSIS

F. L., 35, has been coughing for many years; one year ago he had an extensive hemorrhage from the throat, and has been hoarse ever since. He was treated for his hoarseness, but is getting worse.

He had had a plus 3 Wassermann, and had nine injections of arsphenamine and mercury. In spite of the treatment, his throat was getting worse. Direct laryngoscopy showed a very large white cauliflower mass in the interarytenoid fold. The vocal cords were swollen and infiltrated. An x-ray plate of his lungs demonstrated shadows in the apices. He was getting worse, and dyspneic. September 24, 1924, under direct exposure, part of the mass was removed and the rest destroyed with cautery.

Sections showed a core of connective tissue covered on two sides with squamous epithelium. Some areas beneath the epithelium showed evidence of a subacute inflammation with polymorphonuclear infiltration. Deeper areas showed chronic inflammation with round cell infiltration, no giant cells or special thickening of blood vessel wall (*Figure 9*).

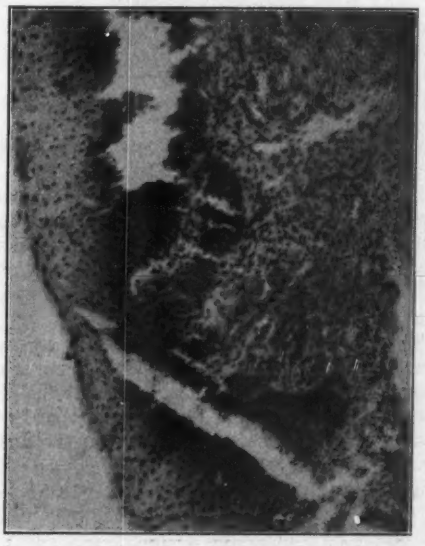


Fig. 9
Subacute inflammation of chronically inflamed tissue. Syphilis or tuberculosis. (Note layer of epithelium with connective tissue, showing inflammatory reaction underneath.)

The patient left the hospital much improved. He returned October 18, 1924, complaining of severe dyspnea, particularly at night. With the laryngeal mirror the cords were seen to be much infiltrated, swollen, edematous, almost obliterating the glottis.

October 19, he had a tracheotomy under local anesthesia. When the larynx was put at rest the infiltration and swelling rapidly diminished. The patient improved, gaining weight, and his cough diminished. Three weeks later he was re exposed with the direct laryngoscope; the larynx was open; the edema and swelling of the cords were gone. He left the city a month later feeling generally much better.

Tracheotomy is a sound therapeutic procedure in syphilis as well as in tuberculosis of the larynx.

A case of decided interest is that of a cyst of the larynx.

J. B. S., age 87, had been hoarse for over four years, and at times food entered his larynx during deglutition. Examination revealed a pale, shiny, glistening mass, the size of a pigeon egg, oval in shape, attached to the left arytenoid and interarytenoid fold and lying over the vocal cords (*Figure 10*). Because of his age, operation

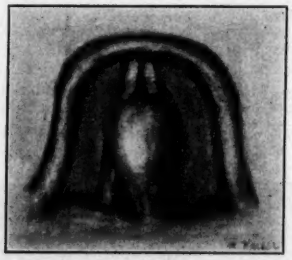


Fig. 10
Cyst of the larynx.

was not urged, and he was advised to remain under observation. He died 18 months later of pneumonia.

Hoarseness caused by paralysis of the recurrent laryngeal nerve, due to pressure from any source, is a part of a symptom complex, which needs no elaboration here, and besides, the role of the laryngologist in these cases is limited merely to assistance in the diagnosis.

The other paralyses, peripheral and central, should be kept in mind. I think the number of cases reported is sufficient to bring out the importance of routine and thorough laryngeal examination of all cases of hoarseness at the earliest possible moment.

Medical Arts Building.

DISCUSSION (*Abstract*)

Dr. G. H. B. Terry, Oteen, N. C.—For the last five years and more my work has been with tuberculous patients. Occasionally, perhaps, under a mistaken diagnosis, we get patients in the hospital who have no tuberculosis, but we have about 600 tuberculous patients all the time, and have constantly under observation from 100 to 200 cases of tuberculous laryngitis. Among tuberculous patients not only must hoarseness be considered a danger signal which requires immediate examination, but it always in our opinion demands immediate treatment and putting the patient at once on voice rest. You may examine the larynx and not be able to determine in your own mind whether it is beginning tuberculous laryngitis or not. You may see some little redness of the larynx, particularly of the cords, and you do not know whether it is due to excessive coughing, or to chronic tonsillitis, or whether it is beginning tuberculosis, but whatever it is, the patient should immediately be placed on voice rest, and as Dr. Daily has said, absolute voice rest. If you cannot get absolute voice rest, I advise whispering and not using the voice much. But the patients must obey instructions explicitly.

I do not hesitate to do a tonsillectomy in cases of tuberculous laryngitis. I always examine the larynx, of course, tell the patient he has tuberculous laryngitis, and if his tonsils are definitely diseased and I can remove them without interfering with his general well-being, I do not hesitate to do so. I take out one under local anesthesia, then in a week or ten days remove the second.

If these patients do not do well under voice rest, they should be cauterized. Not only do we expect to cure many cases by cauterization, but the far advanced, absolutely hopeless cases often get definite palliation from cauterization. We have had some absolutely hopeless cases from a laryngeal standpoint that got a good deal of relief from cauterization. We do it only once a month as a rule, and they have come back in a month for a second cauterization. We admitted one patient with laryngeal tuberculosis who had eaten practically nothing for weeks. His condition was absolutely hopeless from every standpoint. We cauterized his throat, and for one month he was comfortable; he ate, he felt better, and had practically no pain in his throat, but in two or three months he died. I believe in cauterization not only as a curative agent, but also for the relief of pain.

Dr. Murdock Equen, Atlanta, Ga.—I remember about five years ago the case of a child aged 2 years who, following a severe attack of influenza, could not speak. The mother was told that the child's vocal cords were paralyzed as a result of the influenza. Two years later an otolaryngologist who made an examination of the child's larynx saw papillomas on both sides. On the introduction of forceps resistance accompanied by a clicking sound was noted. On the withdrawal of the forceps a pin was found surrounded by granulation tissue. Apparently the child had swallowed a pin and it had stuck crosswise, preventing the vocal cords from snapping together. That case proves the value of roentgen examination previous to the use of a bronchoscope. The case was thought to be so clearly a papilloma that no roentgen examination was made. Following the removal of the pin, the granulation tissue was cauterized and within a few months there was a complete restoration of the voice.

Dr. Daily (closing).—A cauterization with the thermocautery in far advanced pulmonary and laryngeal tu-

berculosis gives much relief. It enables patients to eat and swallow with less pain. Patients often request a repetition of the procedure for the temporary relief that it gives them.

Dr. Equen brought out a good point—that before doing a bronchoscopy for the first time on any patient for any cause, we should take an x-ray picture of the chest. We have always followed out this principle. We found a roentgenogram of great value. It has kept us from doing a bronchoscopy in cases where this might have killed the patient and discredited the procedure. A patient was brought in the operating room with the request by the house surgeon for a bronchoscopy and aspiration. The man was suffering from a severe attack of asthma, his chest apparently full of secretion. The ambulance brought him to the hospital as an emergency. I sent him to the x-ray room for a picture. He had an enormous aneurysm. I refused to do a bronchoscopy and he died 16 hours later. Had an x-ray not been taken on him, he might have died during the bronchoscopy from heart failure or from rupture of the aneurysm.

THE VALUE OF ATMOSPHERIC POLLEN PLATES IN HAY-FEVER AND ASTHMA*

By NARCISSE THIBERGE, M.D.,
and
GEORGE H. HAUSER, M.D.,
New Orleans, La.

This paper is presented not for the allergist nor for the specialist, but for all men doing general medicine. One has but to learn how useful and extensive the information furnished by the atmospheric plate is and the ease with which this information may be interpreted and he will never neglect to consult them.

Many cases have presented themselves to the author where diagnosis and treatment were read from these plates.

In answer to our inquiry relative to an asthmatic whose pollen plates we had examined and upon which we had reported numerous pollens from flowering vines, the family physician wrote: "On receiving your report I had the patient remove the offending clematis decorating the window of her sleeping room. She has been free from her asthma ever since."

A physician was puzzled at the increasing violence of his hay-fever after changing his sleeping room from his home to the eleventh floor of a hotel, until his pollen plate showed triple the number of pollens in his hotel room. His home had some, his hotel room had more. Is it any wonder that he grew worse?

A child going from one spell of asthma into another, each spell increasing in intensity though he had been placed in an open room, was at once relieved on being taken out for a long auto ride in the country. On examination his pollen plates were found peppered with a wonderful collection of pollens from the blooming garden on the three sides of his sleeping room. Here the plate examination not only explained why he suffered but suggested the advisability of the ride. In our allergic clinic recently the diagnosis of asthma in a grain elevator employee whose skin tests were persistently negative to pollen was confirmed by finding molds on his pollen plate.

In clear cut cases of hay-fever or asthma where the skin tests are positive and under appropriate treatment the patients gracefully improve, examinations of atmospheric plates are not indicated; it is in the cases where the tests are uncertain or the patients not improving that the additional help offered by the slide serves to reassure the patient, secures from him better cooperation, and stiffens the morale of the sorely tried medical attendant.

Neither extensive knowledge of botany nor long training are required to do this work; all that is needed is a microscope, a few reagents and a little time. The plate is exposed by the patient for 24 hours in his sleeping quarters. The plate must be prepared by the patient only when ready for exposure and only exposed during the attack. The plate before shipping must be carefully wrapped and excluded from the air in transit. The pollen is fixed, stained and mounted in the laboratory.

The pollens of many plants and trees are so characteristic as to require no stain such as: crab apple, pine, mulberry, plum, sage, spotted lily, plumbago, primrose and sedges. The pollens of trees are quite large usually, are round or oblong and fairly easy to identify. The grass pollens are smooth, while those of the ragweed are spiculated.

The locality from which the plates come will greatly facilitate the research as some plants pollinate late or not at all in certain localities, while in other localities they bloom and pollinate in abundance.

The season during which the plate is exposed will often indicate the identity of the pollen. In winter we look for molds, house dust and animal emanations; in early spring for tree pollen; in summer for grasses, and in the fall for ragweed pollen.

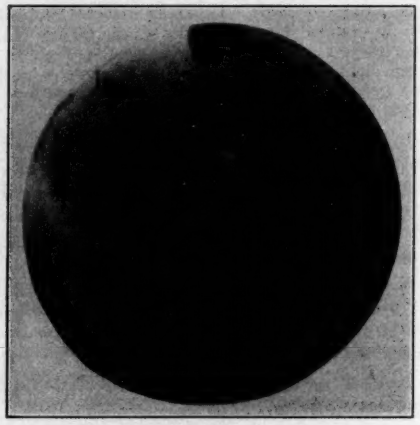
The shape alone of the pollen may identify it: circular, prismatic, three lobed or winged. In other instances the smallness or the exces-

*Read in Section on Pathology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

sive large size will serve immediately to identify it; the markings whether spiculated, smoothed margin or with bodies mottled.

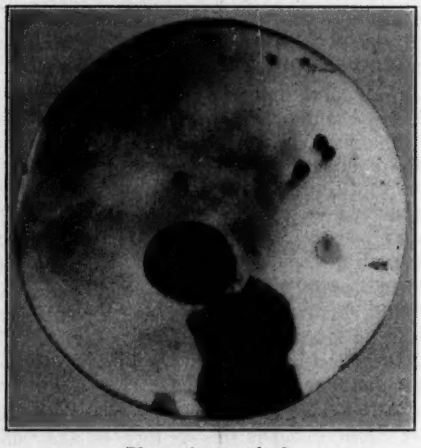
The following method is recommended as the safest though not the quickest. *Table I* is first consulted for the time or near the time of pollination of hay-fever grass or trees and the variety expected at that season in our locality is ascertained.

Then out of the probable list so far obtained, the pollen found is further identified by its size, given in *Table II*.



Photomicrograph 1

The small spiculated pollen of ragweed shows up yellow on the atmospheric plate and the large pollen of grass, pink, with the starch granules contained therein stained blue. The capsule comes out well defined with this stain.



Photomicrograph 2

Small spiculated pollen of ragweed shows up yellow on the atmospheric plate and the large smooth corn pollen, pink, with distinct bluish markings where the starch is concentrated. The medium sized pollen to the right is a grass pollen with the same contrast of colors.

TABLE II

SIZE OF THE POLLENS

A—10-20 Microns
- 13 Plantain, lance leaf
- 13 Plantain, small leaf
- 14 Wormwood, bud brush
- 14 Wormwood, Indian hair tonic
- 15 Cedar, mountain
- 15 Ragweed, common
- 15 Ragweed, false
- 15 Wormwood, bi-annual
- 18 Gaertneric
- 18 Sand bur
- 18 Wormwood, dark leaf
- 19 Lambs quarters
- 20 Amaranth, spring
- 20 Ash, white
- 20 Cedar, red
- 20 Elder, marsh
- 20x15 Burweed
- 20 Grass, cockspur
- 20 Grass, feather
- 20 Willow, black
- 20 Ragweed, giant
- 20 Weed, grease
- 20 Wormwood, false
- 20 Wormwood, sage

B—20-30 Microns
- 18x21 Thoroughworth
- 22 Wormwood, mugweed
- 22 Wormwood, sage brush
- 24 Grass, meadow
- 17x24 Weed, horse
- 24 Cottonwood, Arizona
- 25 Dock, yellow
- 25 Elder, rough marsh
- 25 Grass, sweet
- 25 Hackberry
- 25 Hemps, Western water
- 20x25 Ligustrum
- 25 Grass, Bermuda
- 26 Grass, cockspur
- 26 Grass, Giant Foxtail
- 26 Grass, small bull
- 26 Grass, white
- 26 Grass, tall bull
- 26 Ragweed, Western
- 28 Grass, plume
- 22x28 Wormwood, Absinth
- 30 Elm, American
- 30 Oak, live

C—30-40 Microns
- 32 Willow, black
- 32 Plantain, Rugel's
- 22x32 Cottonwood, yellow
- 18x34 Oak, water
- 35 Hickory
- 35 Oats
- 36 Cockle bur
- 40x25 Elder, boxwood
- 40 Grass, yellow foxtail
- 40 Maple, red
- 40 Walnut, black

D—40-80 Microns
- 45 Grass, Johnson
- 45 Lady's Thumb
- 45 Maple, hard
- 47 Grass, marsh
- 50 Wheat
- 56 Honeysuckle, yellow
- 80 Corn

TABLE I

POLLINATING TIME OF THE PRINCIPAL HAY-FEVER WEEDS AND TREES

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Locality
Cedar, Mountain		+	+										Tex. & Mex.
Cottonwood (Arizona)		+	+	+									W
Elm			+	+									W
Budbrush (Artemesia Spineserus)			+	+	+	+							
Greasweed			+	+	+	+	+	+	+	+	+		Calif.
Maple (hard)			+	+									
Maple (red)			+	+									
Oak (live)			+	+									
Sandbur (Franseria)			+	+	+	+							W
Cedar (red)				+	+								
Box elder (maple)				+	+								
Hackberry				+									
Oak (water)				+	+								
Plantain (long-leaf)				+	+	+	+	+	+				
Yellow cottonwood				+	+								
Walnut (black)				+	+								
Willow (black)				+	+								
Ash (white)					+								
Grass (meadow)					+	+	+	+	+	+			
Hickory					+								
Honeysuckle (yellow)					+								
Povertyweed (Iva Axillaris)					+	+	+	+	+				W
Oats					+	+							
Amaranth (Spiniy)						+	+	+	+				
Corn						+	+						
Dock (yellow) (Rumex)						+	+	+					
Grass (Bermuda)						+	+						
Grass (feather)						+	+						
Grass (Johnson)						+	+	+	+				
Grass (Smut)						+	+						
Horseweed (Erigeron)						+	+	+	+	+	+		
Indian Hair Tonic (Artemesia Drac)						+	+	+	+				N & W
Lady's Thumb						+	+	+	+	+			
Lambsquarters (Chinopodium)						+	+	+	+				
Plantain (Rugel's)						+	+	+	+				
Tall Bull grass						+	+	+	+				
Grass (Yellow Foxtail)							+	+	+				
Grass (marsh)							+						
Foxtail grass, giant							+	+					
Ragweed, Western Ambrosia Pail							+	+	+	+			W
Sagebrush (Artemisia tridentata)							+	+	+				W
Western Water Hemp (Acnida)							+	+	+				Texas
Wheat							+	+					N. Mex.
Wormwood, Absinth							+	+	+	+			N. E.
Wormwood (dark-leafed Artemisia ludo)							+	+	+	+			W.
Wormwood (False Parthenium)							+	+	+				
Wormwood, mugweed							+	+	+	+			W
Wormwood, sage (Artemisia frigida)							+	+	+	+			N & W
Cockle-bur								+	+	+			
Grass, small bull								+	+				
Grass, cockspur								+	+	+			
Grass, white								+	+				
Marsh elder, rough (Iva Ciliata)								+	+	+			
Ragweed, common								+	+	+			
Ragweed, giant								+	+				
Grass, plume									+				
Wormwood, biennial (Artemisia Bienus)								+	+	+			N & E
Thoroughwort Eupatrium									+	+	+		S

The next step is to ascertain whether or not the edges are smooth or spiculated and to classify according to *Table III.*

TABLE III

SHAPE OF POLLEN

A—Spherical and Spiculated
Cockle bur
Gaertneria
Honeysuckle, yellow
Marsh elder
Poverty weed
Ragweed, common
Ragweed, false (Franseria)
Ragweed, Giant
Ragweed, Western
Sand-bur
Wormwood, biennial
Wormwood, false

B—Three-lobed and Smooth
Indian Hair Tonic (Artemesia Drac)
Wormwood Absinth (Artemesia Absinth)
Wormwood Bud Brush (Artemesia Spin.)
Wormwood, dark leaf (Artemesia ludo)
Wormwood mugweed (artemesia hiter)
Wormwood sage (artemesia frig.)
Wormwood sage brush (Artemesia tridentata)

C—Ovoid and Smooth
Box elder (maple)
Cottonwood, yellow
Ligustrum
Oak, live
Oak, white
Willow, black

D—Spherical and Smooth
Amaranth Spiny
Ash, white
Cedar, red
Cedar, mountain
Corn
Cottonwood, Arizona
Dock, yellow
Elm, American
Grass, Bermuda
Grass, large bull
Grass, small bull
Grass, cockspur
Grass, feather
Grass, Giant Foxtail
Grass, yellow Foxtail
Grass, Johnson
Grass, marsh
Grass, meadow
Grass, plume
Grass, sweet
Grass, white
Grease weed
Hackberry
Hickory
Lambsquarters
Maple, hard
Maple, red
Oats
Plantain, Rugel's
Plantain, small leaf
Lady's Thumb
Walnut, black
Water hemp washin
Wheat

E—Ovoid and Spiculated
Horse weed
Thoroughwort

When all this is done, however, our problem is not yet solved, because there are many plants blooming during the same season and producing pollens of the same size and shape.

It was to identify these pollens that Dr. Hauser and I experimented to secure a double stain by which one could be differentiated from the other.

A study of the literature discloses little concerning the staining of pollens except by the application of Lugol's solution to differentiate those containing starch.* This is unlike bacteria on which an enormous amount of work has been done which is of great value in their study and classification.

We thought that the proper staining of pollens might be of great value in the quick identification and study of their internal structure, as well as any differential staining qualities between them.

The work presented today is preliminary to further study and is presented with the hope that it will induce others interested to study the subject.

In beginning this study, many obstacles of a technical nature had to be overcome, wherein the condition differed from those present in the study of bacteria.

For the study, dry collected pollens were used, and whereas bacteria are usually present in an albuminous media and when placed on slides will readily hold when stained, this is not the case with pollens which require a fixative to hold them firmly. This was accomplished with albumin mixture containing white of egg and glycerin in equal parts with 1 per cent sodium salicylate which was spread in a thin layer on the part of the slide used. A small part of pollen was then well spread over the area. The next step was fixation, which can be accomplished by heat gently applied, or chemical fixation. After the use of several methods it was found that ethyl alcohol (95 per cent) placed over the preparation and allowed to dry or left over for at least 1 minute and drained and allowed to dry, gave good fixation.

The slide is then ready for staining. Practically all of the simple and contrast bacterial stains were tried with little or no success. Occasionally a well stained preparation was obtained, but there was no uniformity of results.

However, it was found that a stain consisting of

Eosin (water soluble)	2 gms.
Iodine	4 gms.
Potash iodide	6 gms.
Aqua dist.	100 c. c.

gave very satisfactory and uniform results.

*This refers to the stain advocated by the great late Dr. Scheppegrell, to whom credit is due for pioneer work in allergic conditions.

The stain is applied 3 to 5 minutes, depending on the end result desired, the 3-minute stain being satisfactory for practically all pollens, except where starch is present and it is desired to obtain a deep stain.

The stain is then poured off, the preparation is air dried, and if haste be desired, may then be examined. If not, the preparation may be cleared with carbol zylol (1-5) for 10 seconds, zylol for 30 seconds mounted in balsam under a coverslip and preserved permanently.

The stain gives contrast between different parts of the pollen, shows starch when present, and brings out the fine characteristics of the capsule and the structure within (see plates).

There is also differential color staining in practically all of the pollens, the color varying with the different pollens.

The technical difficulties encountered in the staining of pollens has suggested to us the presentation of a very simple and reliable means to study the air-born pollen in any location, especially with respect to the patient.

This method can also be used as the first part of the staining procedure and make the whole one continuous simple procedure.

The method consists of the use of ordinary glass laboratory slides which are spread over one side with a thin layer of Meyer's egg albumin mixture. They are then ready for use and will remain so for several days. They should be individually wrapped in oil paper and then may be carried to any desired location whether for field work, office work or at the patient's home where they are exposed for the desired length of time. They are then replaced in their wrapper for transportation to the laboratory. Here they are fixed with alcohol and stained as above and ready for examination. If it is desired to examine the pollens instantly, it may be done before fixation.

From the foregoing we have drawn the following conclusions:

(1) Atmospheric pollen plates offer a valuable means of clearing up puzzling cases of asthma, hay-fever and allergic skin diseases.

(2) This method of investigation is simple and available to all medical men.

(3) The albumin-coated film attracts and holds as many if not more pollens than the vaseline or glycerin-coated slide and is instantly ready to hold the stain.

(4) The staining method suggested stains only the pollen, leaving the dust particles unstained in marked contrast.

DISCUSSION (*Abstract*)

Dr. Homer Dupuy, New Orleans, La.—The greater number of cases of hay-fever and asthma, those due to the average pollens, are easily solved with the microscope. The cases, and they are by no means in small numbers, in which aggressive surgery has cut unmercifully into the architecture of the nose and throat with no results, are puzzling. There are very small groups of cases in which the protein from the pus, the purulent secretions, in sinusitis is unquestionably a factor.

The method described by Drs. Thiberge and Hauser is apparently simple and artistically colorful. I personally have been so discouraged over my results in cases of hay-fever and asthma that we have welcomed the institution of this work in the Charity Hospital.

Dr. Thiberge (*closing*).—The more we do allergic work and testing, the more we realize that many cases are due to defects in assimilation, and we can well understand how an individual will be able to assimilate a certain amount of food, which goes into his blood, not as the original food, but as the assimilated, which is entirely different. If he steps over that limit and takes a larger quantity, say of milk, part of it will become a new substance, but part of it will go into his blood as undigested milk or undigested food, and that part will cause the asthma or allergic symptoms.

TREATMENT OF CARCINOMA OF THE LARYNX WITH A REPORT OF CASES*

By JOSEPH I. KEMLER, M.D.,
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It is now quite well known that the larynx offers the most favorable site for the eradication of malignant growths found within it. Crile[1] substantiates this fact by stating that no operation in surgery offers so certain and permanent a cure as that of intrinsic cancer of the larynx. The construction of this organ, a cartilaginous box surrounded by a small number of lymphatics connecting its interior with the neighboring lymph nodes, makes ganglionic invasion tardy and allows a neoplasm to remain localized for a long time. It is not unusual to see patients who have had carcinoma of the larynx for years presenting very few symptoms. This makes it imperative to bear in mind the possibility of malignancy in all patients who present the cardinal symptom of hoarseness for any length of time, no matter how slight, if

*Received for publication October 12, 1931.

we are to give our patients the benefit of the permanent cure which is certain in the earlier stages of this condition.

In patients over forty years of age the diagnosis of cancer becomes more probable; but cases of carcinoma in much younger patients have been reported in the literature and some of them have required total laryngectomy. Figi and New[2] report a case in a boy only fifteen years of age. Glaring instances of long delay in diagnosis of this condition, especially in younger patients, even after years of close observation by experts, emphasize the need of a more certain method of determining the true nature of the lesion. Hammond[3] describes such an instance and believes that tuberculosis and malignant disease may run a course so similar that it is clinically impossible to differentiate them. Buck[4] reported a case apparently tuberculous in which a squamous cell type of epithelioma was discovered at autopsy. Routine biopsy in every doubtful case is the only certain means of determining the true nature of the lesion. In my opinion it is an unpardonable offense to omit such a simple procedure, which can be easily and quickly done in the office by the indirect method. Biopsy, however, should never be performed without an understanding with the patient that, if proved malignant, the new growth should immediately be eradicated by operation. The danger of performing biopsy is demonstrated by the following case:

N. M., aged 48 years, came under my observation January 7, 1930. He had been hoarse nearly all his life; worse for the last six months.

The family history was negative.

Eleven years before he had had "flu," following which, according to his statement, he had a hemorrhage from the throat. There was no further trouble until three years previously, when he had hemoptysis and was sent to the State Sanatorium for tuberculosis. In six months he was discharged as an arrested case. Since then he had felt well until the present illness.

Examination.—There was an infiltration in the anterior third of the ventricular band of the larynx on the right side, irregular in outline, pale in color, typically a tuberculous lesion. The cords were freely movable and no other pathological changes could be made out. His lungs were found to have old lesions in both apices with no marked activity. The x-ray revealed a spotty infiltration in the right upper lobe, indicating a definite tuberculous infection which "may be active at this time." With the past and present history and with the appearance in the laryngeal mirror, I did not hesitate to cauterize the entire infiltrated area with the electric cautery. January 22, 1930, two weeks later, the patient returned and upon examination I found a strawberry-like growth in the cauterized area with no further extension. I immediately removed a piece for examination and it proved to be an "early epithelioma."

Five days later he was on the operating table for a laryngo-fissure under local anesthesia. The larynx was opened by Jackson's method, cutting through the cartilage in the midline and dissecting the perichondrium over to the left side beyond the growth. We found the tumor occupying two-thirds of the ventricular band and cord of the right side, crossing over to the opposite side and extending along one-third of the left ventricular band. The entire right side of the larynx was cleaned out and two-thirds of the opposite side likewise dealt with. There were no metastases to the lymph nodes to be felt anywhere. The tracheal tube was removed and the entire larynx closed as in St. Clair Thomson's operation, and the patient made an uneventful recovery. Granulations removed from the larynx June 4, 1930, proved to be negative for carcinoma. The patient has obtained a strong voice and resumed his occupation as tailor. He has had no further trouble, but is still being watched.

An argument has been advanced by Craig[5] and others that biopsy is not necessary if we can exclude syphilis and tuberculosis. The former should always be excluded both by laboratory and therapeutic tests. But the two cases cited above indicate that tuberculosis can not always be excluded except by microscopic examination. Then again a patient may have two or all three diseases at the same time, as demonstrated by MacKenty[6] and Tucker.[7] The latter emphasizes the necessity of a thorough routine study in making a differential diagnosis in laryngeal disease, and concludes that biopsy as a final step, with the histological examination of the tissue by a competent pathologist, is the most reliable aid in differential diagnosis in ulcerative laryngitis, and, when positive, gives evidence that can be obtained by no other method.

After a diagnosis of intrinsic malignant growth has been established, there is only one consideration to be entertained, namely: the eradication of the tumor and the prevention of its recurrence. Complete laryngectomy, of course, accomplishes these results. The dangers of this operation have been entirely eliminated by the untiring and successful efforts of MacKenty,[8] Lynch[9] and others, who transformed this difficult and mutilating undertaking into an ordinary major surgical procedure. With the substitution of the artificial larynx made by the Western Electric Company, the loss of the larynx is not so great, and the horrors of the after effects are eliminated. Still, the patient has the inconvenience of speech through an artificial organ, and he remains throughout life a tracheal breather with or without a tube.

After radium was introduced, laryngologists took up this remedy with great enthusiasm because it promised a destruction of the growth without damage to the surrounding tissues. The literature became replete with reports of cases

of cures of carcinoma of the larynx with radium. But, unfortunately, the cures were only apparent and soon discouraging results were noted. Imperatori,[10] Harris[11] and Orton[12] reported numerous cases treated with radium over a long period of time with absolutely no benefit and even with harmful effects. Harris[11] states that he would rather endure the disease than risk the uncertain results from radium. From my own observation I quite agree with him. However, we cannot ignore some of the more recent foreign reports such as the one from St. Bartholomew's Hospital,[13] London, where it is claimed a cure of carcinoma of the larynx has been produced in five out of six cases for a period of three years. It is urged that we did not know how to apply the radium. Its selective action upon the cancer cell was denied by experimental proof and expert knowledge was required for its application. Hence the disastrous results of radium in the early methods employed. It is now thought by Finzi and Harmer[14] that a better working scheme has been found by embedding radium needles into the cancer tissue after resecting the greater part of the thyroid cartilage, and that this will produce more favorable results. Whether this is true or not, time alone will tell.

Deep roentgen ray therapy has also been found worthless, since the ray cannot penetrate sufficiently through the cartilage without burning and destroying the rest of the tissues. But Portmann,[15] of Bordeaux, has introduced the x-ray treatment after removal of the thyroid cartilage, leaving a framework to support the larynx, and claims to get good results. Regaud[16] demonstrated by statistics that over 60 per cent have been cured for a period of three years by x-radiation.

Recently diathermy has been introduced by Harmer,[17] Doyen,[18] Dan McKenzie[19] and others, and they have obtained some beneficial results.

A claim is made that electro-dessication has a killing effect on cancer cells and a bactericidal effect on the body tissues in general. But this method has only been used in inaccessible and inoperable cases. Schmiegelow[20] reported three cases of carcinoma of the larynx so treated, two extrinsic and one intrinsic, with excellent results. And Craig[5] is quite enthusiastic about its use in early cases. When the growth is limited to the vocal cord it is destroyed through the laryngeal speculum. When the ventricle and false cords are involved, the larynx is split open to obtain a satisfactory exposure of the growth. When there is more involvement than this, Craig advises laryngectomy.

I am in perfect accord with the opinion of Fielding O. Lewis[21] that when it is possible to eradicate the malignant growth by surgical operation with a reasonable prospect of cure, no other treatment is worthy of consideration. Pinch[22] also advises surgical procedure in preference to radium in early cases of carcinoma of the larynx, reserving radium as a palliative measure in inoperable cases, and for those who refuse operation.

The English surgeons are more inclined towards laryngo-fissures, while we Americans seem to prefer laryngectomies. If the carcinoma can be entirely removed by the former method, it gives ideal results. I have performed this operation five times, and all have remained cured. It has been nine years since the operation on my first patient with no recurrence.

The patient was forty-four years of age and had the scirrhous type of carcinoma extending over two-thirds of the length of one cord, crossing the anterior commissure and occupying half of the other cord. One cord was completely fixed, the other somewhat movable. The duration of the condition was more than one year. I hesitated to do a laryngo-fissure on account of the involvement of both cords, but the patient would submit only to this more conservative operation. He made an uneventful recovery and, after a very short interruption, resumed his occupation as butcher, working hard ever since.

The operation is performed according to the method described by St. Clair Thomson,[23] but local anesthesia is used instead of ether. The patient feels absolutely no pain or discomfort during the procedure. I inject both superior laryngeal nerves with 2 c. c. of 1 per cent solution of novocaine and infiltrate the skin over the line of incision with 0.5 per cent novocaine solution. Tucker[24] has performed laryngo-fissures very extensively and claims 80 per cent cures. But unfortunately this operation has its limitations and is only ideally adapted to early cases of carcinoma of the larynx located in the anterior part of one cord without fixation and without glandular involvement. Practically, it has proved quite a satisfactory treatment in much more extensive involvement of the cords as illustrated by the two cases cited above and by the report of Dundas-Grant,[25] who agrees with St. Clair Thomson[23] that good results are obtainable by laryngo-fissure, even when the disease has spread across the anterior commissure, so that all of one cord and part of the other have to be excised. With the education of the public and the alertness of the physician in

recognizing malignancy early, we ought to find more cases suitable for laryngo-fissure and less for laryngectomy.

When the posterior parts of the cords are affected, and when the carcinoma has extended to the arytenoid cartilages, there is no argument against laryngectomy. There are two types of operation to accomplish the removal of the larynx: the one-stage and the two-stage operations. The former is described very lucidly by Dr. MacKenty[8] in his monograph. If all goes well, the results are very quick and gratifying. But the one stage operation entails a great deal of care before, during and after the operation. Any deviation from the procedure as described may result fatally. For this reason, New,[26] of Rochester, modified Crile's[1] two-stage operation, which does away particularly with the cumbersome after-treatment. I use this method, with slight differences. In the first stage, after completely skeletonizing the larynx, a circular piece is cut out of the lower half of the cricoid cartilage, and an ordinary number 5 tracheotomy tube inserted. In most of my cases a tube had to be introduced to relieve dyspnea and the patient had no greater reaction than those in whom the larynx was opened four days later as recommended by New.

The second stage of the operation is done from six to eight days later under light rectal ether anesthesia, which is given one-half hour before operation. The wound is opened very easily; the trachea is then cut across and the larynx is dissected away from the esophagus under infiltration anesthesia. A little additional ether is then administered intra-tracheally and the operation completed, according to New. The feeding tube is then put in for the first time.

The following case illustrates the efficiency of this operation:

S. B., aged forty-five years, came under my observation July 13, 1930, complaining of hoarseness and pain in the throat radiating to the left ear. The family history, as well as the past history, was negative. The hoarseness had existed for over two years and was gradually getting worse, and within the last two weeks dyspnea was rather marked. Upon laryngeal examination an extensive tumor, irregular in outline, was found arising from the left arytenoid, filling out and replacing the entire left side of the larynx and filling out the pyriform sinus. The left side of the larynx was absolutely immobile. The right moved only slightly. There was very little breathing space left. I explained to the family and the patient what the condition was and urged the patient to enter the hospital for complete general examination. Instead he went for further consultation to Philadelphia and New York, and in both places he was advised to return home and have a tracheotomy followed by radium treatment. Having seen some of the horrible effects of radium, I advised against its use. A tracheotomy alone, in my experience, in such a case is equally pitiful, as sooner or later the tumor ulcerates; begins to bleed; pain continues to increase; dysphagia sets in; and the patient is most miserable. Tracheotomy should only be done where there is absolutely no hope. In this case I thought there might be a very slight hope and explained to his relatives that there was nothing to lose but possibly everything to gain by a laryngectomy. Physical examination revealed a bronchiectasis demonstrated by x-ray and physical findings. The Wassermann reaction was negative. The tumor was so evident and the patient so dyspneic that no biopsy was done; and a two-stage laryngectomy was performed as outlined above.

The patient stood the operations very well, but he coughed up much pus from his lungs. Another complication arose which was not reckoned with before the operation, namely: that the patient had an aversion to milk and eggs, the two mainstays of diet during the convalescent period, which produced vomiting. This, together with the cough, tore all the sutures except a few in the skin which kept it partly united. This I opened up freely, cleaned and dressed the wound twice daily and waited for the infection to clear up, intending to do a subsequent plastic repair. During this time the nasal feeding tube, which was exposed in his wound for at least three inches, was held in place and the patient fed with broths, strained vegetables, meat and fruit juices. Later on we got him accustomed to milk and eggs and the feeding problem was solved. The wound became cleaner and contracted to a very small opening just above the tracheal stump. The tracheotomy tube was left out until the contraction became so great that it had to be reinserted. Then the contraction stopped and an esophageal fistula remained. Curettement and suturing twice did not accomplish the desired result. I then allowed the fistula to scar up, and under local infiltration anesthesia excised the granulations and cauterized with the electric cautery the walls of the fistula, allowing the wound to remain open while keeping it dry. Ten days later the fistula was completely and firmly closed; the nasal feeding tube removed, and the patient discharged perfectly healed.

Although it is only one year since the operation and the final outcome cannot be told, in this short interval the patient has begun to enjoy good health, has gained greatly in weight, and has a very bright prospect of life.

I think the midline incision saved the patient from a second and uncertain plastic operation.

CONCLUSIONS

Malignant growths of the larynx, even those of large size and of long duration, are amenable to treatment. Surgery should be used when possible in preference to all other methods of procedure. Laryngo-fissure, when indicated, gives the most ideal results and can be done very easily under local anesthesia. It has been

successfully used in some cases where the disease has spread across the anterior commissure. Laryngectomy offers the most positive and permanent cure. In my hands, New's two-stage operation with the few modifications outlined has proved advantageous. It lessens shock, does away with the complicated after-treatment, and if esophageal fistula results, no matter how large, it can very simply and easily be closed.

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1908 Eutaw Place

ACUTE LARYNGEAL OBSTRUCTION IN CHILDREN: CASE REPORTS*

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In the past four years there have come under our observation 104 cases of severe acute laryngeal obstruction, in 89 of which intubation has been necessary. Of these cases, 93 were laryngeal diphtheria and in 11 cases the obstruction was due to other causes. These cases are fairly typical of conditions that arise in pediatric practice in this section.

LARYNGEAL DIPHTHERIA

These cases consisted largely of patients referred from out of the city. Of the 93 cases of laryngeal diphtheria, 77 were in hospitals during treatment and 16 were treated in the home or at the office. Of the 78 intubated cases of laryngeal diphtheria, 68 were treated in the hospital and 10 in home or office. Four colored children were intubated in the office and allowed to go home. All of these recovered, and two coughed up their tubes, without any subsequent return of dyspnea. The history of two to three days of laryngeal dyspnea without a physician being called was quite frequent throughout the series. Most of the intubations were semi-emergency procedures. The hospital conditions were such that all the work had to be done by Dr. A. S. Root and the writer, there being no interns capable of intubating or of carrying out any necessary measures. For this reason it has been impractical to adopt the well known and wise plan of repeated aspiration of membrane through a laryngoscope, as practised at the Willard Parker Hospital. Repeated aspiration at six-hour intervals is usually necessary, and for a practising physician to undertake this it would be necessary to be up night and day with consequent neglect of his other work.

The plan adopted was as follows: after intubation the string was left attached until the immediate paroxysm of coughing was over. It was then removed in the children over two years of age. In those under two it was left attached and held to the face with adhesive, and the arms were restrained with cuffs. Tubes were left in place for approximately 72 hours, the extubation always being done in the morn-

*Received for publication October 12, 1931.
*Read in Pediatrics Section, North Carolina State Medical Society, April, 1931.

ing because of the well-recognized tendency of all forms of laryngitis to improve in the morning, and because a closer observation could be kept on the child at that time. The tubes were removed earlier than is usually advised, for the very practical reason that each day in the hospital was a matter of considerable expense to the parent. If the child was breathing easily eight hours after extubation, he was discharged. Tubes were never removed until the temperature had returned to normal and all signs of faucial or pharyngeal membrane had disappeared. When it became necessary to replace tubes these were left in either 48 or 72 hours, depending on how quickly the obstruction appeared after the removal of the tube. Tracheotomy was considered or done in those patients who were unable to go without tubes at the end of three weeks, or who repeatedly coughed up the tube and immediately became strikingly dyspneic, requiring emergency intubation. The strings were left attached in the younger children where possible, because we felt that the excitement attendant upon removal of the tube with the extubator was responsible in many cases for laryngeal spasm following the extubation, which made immediate replacement necessary. All the cases were attended by special nurses, one nurse caring for all patients who happened to be in the hospital at the same time. The largest number of patients present at the same time was five (November, 1928). The statistical report of the 78 intubated cases of laryngeal diphtheria follows:

INTUBATED CASES, 78 TO DATE

Year—1927, 4; 1928, 30; 1929, 30; 1930, 13; 1931, 1.

Average Age—3.5 years; youngest, 11 months; oldest, 10 years.

Month of Year—January, 1; February, 1; March, 2; April, 0; May, 0; June, 0; July, 1; August, 7; September, 8; October, 25; November, 24; December, 9.

Cases in cities, 12.

Cases in rural section, 66.

Average duration of symptoms before intubation, 3.4 days.

Longest duration: 1 case 12 days; 1 case 10 days.

Shortest: 7 hours (2 other cases intubated 24 hours).

Presence visible membrane, 63; absence, 15.

Days in hospital (average), 4.4. Longest, 30; shortest, 3 cases 24 hours (tubes coughed up).

Cases requiring replacing of tube, 19; once, 7 cases; twice, 6; 3 times, 2; 4 times, 2; 11 times, 1 case.

There were 13 cases which required intubation 12 or more hours after antitoxin administration. Two of these were intubated 48 hours after they were given adequate doses (subcutaneously) by family physician.

Two cases developed symptoms of laryngeal diphtheria after antitoxin had been given for pharyngeal diphtheria.

Tracheotomy, 2 cases (one death).

Deaths, 12. Mortality, 15.3 per cent. Excluding 3 moribund cases, mortality 12.6 per cent. Mortality due to accidents connected with the obstruction, 2 cases. Mortality, 2.5 per cent.

Cause of Death—Moribund, 3; toxemia, 2; myocarditis, 2; pneumonia, 2; tracheobronchial diphtheria, 1; coughed up tube and died, 1; tube obstructed with membrane, 1.

UNUSUAL OCCURRENCES

(1) Baby Jones, 15 months old, was unable to breathe without his tube after wearing it three weeks. He coughed up the tube and almost died. Tracheotomy was done the same day. He was still unable to breathe at all through the larynx at the end of another four weeks and was sent to Dr. Chevalier Jackson. Under Dr. Jackson's treatment for six months he finally recovered.

(2) Baby Pearce developed laryngitis during the course of measles. This gradually increased and a positive culture was obtained. This child required intubation.

(3) Helen Willis was given antitoxin late in the disease, required intubation, and developed in the second week signs of myocarditis; bradycardia, pallor, arrhythmia, nausea, restlessness, poor quality heart sounds. She recovered after one month of severe illness.

(4) Baby Frazier, 15 months old, had severe laryngeal diphtheria. The tube was removed at the end of four days and had to be immediately replaced. It was removed at two to five day intervals eleven times over a period of thirty days. On the twenty-fourth day a tracheotomy was planned, but the temperature was elevated to 104° and the operation was postponed. He had a mild bronchopneumonia lasting five days. It was decided after this to try extubation once more and, although moderate dyspnea continued for over 24 hours, it finally disappeared.

(5) In Leon Spencer, 10 years old, intubation was necessary seven hours after onset. Relief of dyspnea was complete. On the following day his temperature rose sharply to 105°; he developed cyanosis and rapid breathing. The type of breathing suggested tracheal obstruction, but due to the rapidity of breathing, the high temperature and cyanosis, we felt that he was developing pneumonia. The interesting point about the case is whether he had obstruction in the tube, tracheal diphtheria or bronchopneumonia. It might have been wise to remove the tube and replace with a larger one. The decision was that his condition was so desperate that the effort would prove fatal. He died the same day. In the light of subsequent experience I would now remove this tube and replace with a larger.

(6) Baby Hawley, 3½ years, was one of the most unusual of the cases. Twelve days before he was seen he went to sleep on a pile of cotton. The same night he became "croupy" and apparently asthmatic. These symptoms continued unchanged for twelve days. When seen by us he had laryngeal obstruction of a moderate grade and definite asthmatic breathing. A foreign body in a bronchus was suspected. X-ray of the chest was negative. Dr. J. B. Wright did a bronchoscopic examination and found no foreign body, but a small tag of tissue on the wall of the larynx. This gave a positive culture for diphtheria and all the symptoms cleared up in four days after 10,000 units of antitoxin. Intubation

was done to relieve laryngeal obstruction following the bronchoscopic examination. There was another patient who had had symptoms of laryngeal obstruction for ten days before intubation became necessary.

(7) Baby Campbell had tracheobronchial diphtheria. He had been given 36,000 units of antitoxin by the family physician in the 36 hours before intubation and the symptoms continued to progress.

(8) Baby Foster had a moderate grade of laryngeal diphtheria with a positive culture when seen by us. He had been intubated one year before for laryngeal diphtheria.

(9) Baby Harris, 3 years, presented two interesting features. First, he was given 10,000 units of antitoxin for pharyngeal diphtheria with no laryngeal symptoms. Twelve hours later he developed symptoms of laryngeal obstruction and progressed rapidly to severe dyspnea, requiring intubation the next day. The second feature occurred at the time of intubation. The tube went easily into the larynx and after a few minutes the string was removed. In two or three minutes he coughed the tube full of membrane, stopped breathing, clenched his teeth and became strikingly cyanotic. Fortunately, a violent expiratory effort expelled the tube and it did not become necessary to replace it. There were two patients in whom the tube displaced the membrane which was coughed up and gave permanent relief and two others in whom relief was temporary, lasting several hours before intubation again was necessary.

GENERAL IMPRESSIONS

(1) A fairly large number of the patients who required intubation had not lost their voice, and in a few it was little changed.

(2) Throat cultures were done in very few of the cases, the intubation being done on the third or fourth day of the croup and being an emergency.

(3) No case that we had the opportunity to observe showed any striking unmistakable response to antitoxin under 18 hours. (The antitoxin was given intramuscularly.)

(4) The patients whom we saw *in extremis* appeared in more danger of dying from circulatory failure than asphyxia. This conforms to the accepted idea.

(5) Marked restlessness and signs of exhaustion are better indications for intubation than signs of obstructive breathing.

(6) The children under two years were more likely to require replacing of the tube after its removal than the older children.

(7) Only one patient who had breathed easily for eight hours after removal of the tube developed dyspnea later.

(8) Only one of these patients is known to have had toxin-antitoxin, and there was none who had had a negative Schick.

LARYNGEAL ORSTRUCTION AND INTUBATION WITHOUT DIPHTHERIA

DIAGNOSIS

Following bronchoscopic examinations for removal of foreign bodies in air passages, 6.
Abscess of larynx formed around a fishbone, 1.
Closure of larynx by granulation tissue following emergency "dirty" tracheotomy, 1.
Influenzal laryngitis, 2.
Scarlet fever, 1.
Laryngeal polypi, 1.

POSTBRONCHOSCOPIC EDEMA

The patients who had bronchoscopic examinations for removal of foreign bodies from the air passages developed signs of laryngeal obstruction two to four hours after the procedure. These children were under four years old and practically all had aspirated peanut particles or kernels of some type. All of them had shown some symptoms of laryngitis before the bronchoscopic examination. Laryngeal edema in this type of case is less frequent when the foreign body is metallic in character. The bronchoscopic examinations were all done by Dr. J. B. Wright, an expert bronchoscopist. The indications for intubation were the same as those used in laryngeal diphtheria: degree of obstruction, signs of exhaustion, circulatory failure and marked restlessness. There was no case in which intubation failed to produce marked improvement in the child's comfort, and in four of the six the dyspnea was strikingly relieved. Of course the symptoms of bronchial spasm and inflammation were little affected. We feel that intubation for this condition is a logical and wise procedure. The tubes need to remain in only about 48 hours. Of these six patients, two died. One was 18 months old and was breathing well with a normal temperature 48 hours after the peanut was removed and intubation done, when his temperature rose suddenly to 105° and death followed in about two hours. This was probably a suddenly developing pneumonia. The second fatal case in this group is the most unusual of all the cases seen.

CASE REPORT

Baby Stella Bradshaw, 19 months old, strangled while eating peanuts and aspirated a particle. She had a violent spasm of coughing, continued to cough frequently and had high fever for the following ten days. Two weeks from the accident she was brought to Dr. Wright and one-half a peanut kernel was removed from the right main stem bronchus. Following the removal of the kernel she developed laryngeal obstruction and was intubated with complete relief. She breathed easily for two days and then signs of obstruction returned. The tube was removed and replaced with the next larger size. She breathed easily then for about twenty-four

hours, when difficulty returned, and this time it was obvious that the dyspnea was of the type due to tracheal obstruction. The child's condition at this time was becoming very serious and it was decided to do a tracheotomy. When the trachea was opened it was immediately obvious that it was filled with a typical diphtheritic membrane. A positive culture for diphtheria was obtained from this. The child had developed tracheal and laryngeal diphtheria superimposed on the inflammatory process due to the foreign body and the bronchoscopic procedure. The child died the day on which the tracheotomy was done.

Since that time we have given diphtheria antitoxin to all patients in whom laryngeal or tracheal obstruction has persisted more than one or two days after the bronchoscopic procedures, and to all patients in whom foreign body in the air passages has been strongly suspected and in whom the x-ray and bronchoscopic examination have failed to reveal it.

MISCELLANEOUS CASES

Only a brief general statement about the other six cases will be given. The intubations were done in the two cases of influenzal laryngitis as a late and desperate effort in practically hopeless cases. Both children died. One of them had a serious congenital abnormality of the heart and had always shown striking cyanosis on exertion. The laryngeal obstruction was part of a severe influenza with marked toxemia. Tracheotomy, which is usually recommended in preference to intubation in this form of acute laryngeal obstruction, would certainly have produced an immediate fatality. A quick intubation was done with very little extra load on the circulation, and the child died of toxemia and cardiac failure about 18 hours later. The second of the influenza cases was a typical fulminating influenzal pneumonia with some laryngeal obstruction. Intubation was a total failure in this case and the tube was removed by the string after being left in place only about ten minutes. The situation in the case of scarlet fever was similar. The child was overwhelmed with the toxemia of a severe infection when laryngeal obstruction developed. The tube relieved the dyspnea, but death followed the same day. Diphtheria antitoxin had been given two days before in spite of repeated negative cultures, so the laryngitis was a rare complication of scarlet fever and not diphtheritic in character.

The other cases really come under the head of chronic laryngeal obstruction, though the intubations were usually done during an acute exacerbation from various causes. The use of indirect intubation in these patients was an adjunct to other forms of treatment, but without it these children would have died; for in a real emergency, indirect intubation is a much quicker procedure than treacheotomy or direct intubation.

AGRANULOCYTIC ANGINA*

By W. W. CHRISMAN, M.D.,
and
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When the description of a new symptom complex makes its appearance in medical literature we are at once confronted with the question whether a new disease has been discovered or some previously unemphasized pathologic phenomena have been correlated with clinical pictures hitherto poorly understood, and thus has acquired a prominence which it may not continue to hold. Senator,[1] in 1888, called attention to the highly fatal character of some cases of phlegmonous sore throat. We have no information as to the blood picture in those cases. That agranulocytosis or, more properly, granulocytopenia, is a feature of a number of disease conditions is not to be doubted.

The earliest case we have found of probable agranulocytic angina was recorded in 1902 by P. K. Brown[2] under the title, "A Fatal Case of Primary Pharyngitis with Extreme Leucopenia." The patient had a membranous pharyngitis, fever, leucocyte counts from 1,000 to 260, the polymorphonuclears being recorded as low as 1 per cent. The patient died on the seventh day. In 1904, Schwartz[3] reported the case of a boy, aged nine years, with a renal or perinephritic abscess that ruptured into the urinary tract. Improvement followed, but after a few weeks there developed gingivitis, submaxillary adenitis and a leucocyte count of 600, with no polymorphonuclears. Death followed rapidly. In 1907, Turk[4] reported the case of a woman, aged forty-five years, with staphylococcus sepsis accompanied by fever, chills, headache, anorexia and later, diarrhea. These symptoms were followed by stupor, a mitral murmur, an embolic skin eruption, adenitis, ulceration of the lip, necrotic patches on the gums and a patch of consolidation in one lung. The red cell count was normal. The leucocytes were 940 and there were no polymorphonuclear neutrophils. Death occurred at the end of a month's illness and was preceded by a membranous tonsillitis, tenderness over the ribs and sternum and a palpable spleen. Autopsy revealed fresh endocarditis, lung abscess, staphylococcus in the blood stream and no evidence of leukemia. In the bone marrow small hemorrhagic areas were found and most of the white cells were lymphocytes and plasma cells. Stursberg,[5] in 1912, and Marchand,[6] in 1913, recorded cases with lesions on the buccal and pharyngeal membranes, sepsis and leucopenia with absence or marked

*Received for publication September 15, 1931.
*Read before the Medical Association of Georgia, May 14, 1931.

decrease in the polymorphonuclears. It remained for Schultz,[7] in 1922, to report 6 cases occurring in middle-aged females and to designate the symptom complex "agranulocytosis," a condition which he considered invariably fatal.

For several years following Schultz's paper the reports were almost entirely of German or Austrian origin. Kastlin's[8] review of the subject in 1927 included 43 cases and Gundrum,[9] in March, 1928, could find only 47. At present, over 200 cases have been reported in which this diagnosis was made, in some, it seems to us, with very little justification. In a recent survey of the literature in this country 96 case reports were found.

It does not seem improper to report 3 additional cases recently encountered by us for the following reasons: (1) to increase the material available for a critical study of a poorly understood condition; (2) to urge the free use of leucocyte and differential counts in all suspected patients; (3) to suggest that, until something better is known, patients be given the benefit of the treatment that seems to have helped.

Case 1.—Mrs. E. C. L., a white woman, age 47, was seen October 23, 1930, complaining of sore throat and fever. The onset, two days before, was marked by chilly sensations, generalized aching and a slight sore throat. These symptoms increased in severity and on the following day she had two chills and high fever. When first seen her temperature was 104°, the pharynx was very red and there was a greyish membrane on the tonsils. Cultures were made from the membrane and she was brought immediately to the hospital.

The past medical history was essentially negative. She had had bilateral pneumonia at the age of twenty and pleurisy at twenty-seven. Her tonsils and appendix had been removed in 1927. She had passed the menopause at the age of thirty-seven. She had married ten years before, became pregnant, but miscarried at six weeks. Her husband died five years before of luetic aortitis and myocarditis. For the previous seven years her weight had been near 180 pounds. The patient had been under the observation of one of us (C. C. H.) since 1926. Nervousness had been her chief complaint during this time. Hypothyroidism was considered, but the pulse rate was never found below seventy, the scalp and skin were not dry, and she admitted over-eating. Cooperation in the diet could not be secured and her weight remained about the same.

Physical Examination.—The general appearance of the patient quite strikingly resembled that of a person in a typhoidal state. She complained of headache, sore throat and aching in both shoulders, hips and knees. The skin was moist and showed no evidence of jaundice or purpuric spots. There was tenderness over both frontal sinuses. The pharynx was diffusely red and there was a greyish membrane on the tonsils and pillars. The breath was foul. The anterior cervical lymph nodes were enlarged and tender. The heart and lungs were normal to percussion and auscultation. The liver and spleen were not palpable.

Laboratory Examination.—There were 4,730,000 red blood cells and 1,900 white cells. Polymorphonuclear neutrophils were 4 per cent. Small lymphocytes 46 per cent, large lymphocytes 50 per cent. A smear from the throat showed staphylococci and streptococci. Culture from the throat showed staphylococci. Malarial parasites could not be found. The icterus index was fifteen. The Wassermann reaction was negative. The daily blood counts will be shown in *Chart I.*

Course in Hospital.—Gargles and local applications to the throat were used frequently. On October 25, a small necrotic area was found on the right tonsil and a small lesion was found in the vulva. The next day the gums were swollen and spongy and the patient complained of pain in both mandibles. The patient continued in a condition of profound prostration. When aroused her mind was clear, but she would lie for hours without making a movement or speaking. Often she remarked that she felt too exhausted to live. On October 28, the membrane on the tonsils was

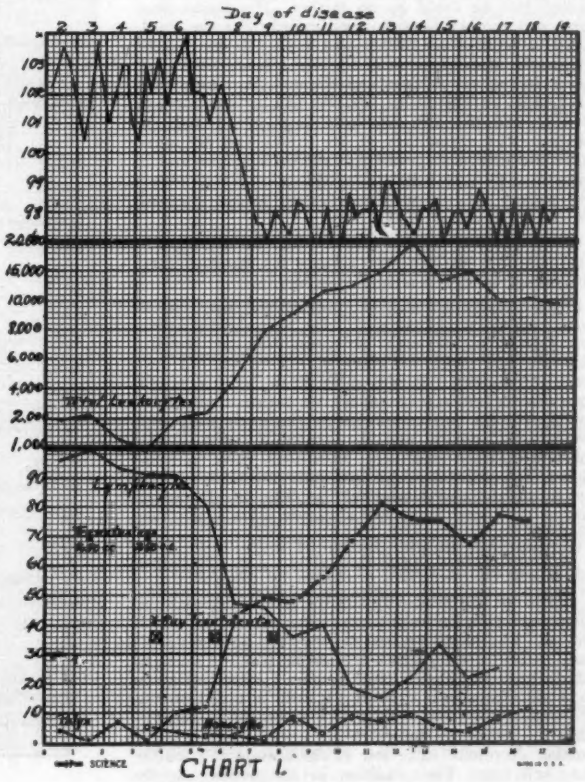


CHART I.

disappearing and the swelling of the gums was receding. On October 29, both tibiae were aching and moderate pressure caused rather severe pain. She was unable to void and the bladder was emptied by catheter. Her general condition was improving and her appetite returning. Two days later dysuria and pyuria developed. The possibility of a lesion in the bladder similar to those in the pharynx and vulva was considered, but following instillations of mercurochrome (2 per cent) these symptoms disappeared quickly. The temperature curve, daily blood counts and treatment are given in *Chart I.*

Case 2.—E. A. F., a white man, aged 46, a bank executive, for several months had been doing very heavy work brought on by the liquidation of his bank. He became so depressed over financial affairs that his physician advised a few weeks' rest. On January 5, he had a slight sore throat, but local applications by his physician and gargles brought relief, and on the following day he started by automobile for Florida. After driving 200 miles he was unable to go farther because of great fatigue. During the day the soreness in his throat had returned and a physician was called. Again silver nitrate was applied to his tonsils and gargles were given. That night he had a chill, ached all over and slept very little. He resumed his trip the next day, but after driving 100 miles he was so nearly exhausted that he could go no farther. His throat was worse and another physician was called. For the third successive night silver nitrate was applied to his tonsils and gargles were prescribed. Shortly after midnight he had a feeling of collapse and thought he was dying. When seen by one of us (W. W. C.) a few minutes later he had partially recovered from the feeling of collapse. The appearance of his throat and the profound prostration suggested agranulocytic angina and a leucocyte count revealed only 350 cells per cu. mm. The patient was carried immediately to the hospital and x-ray treatment was given.

The past history was negative except for the significant fact that he had had asthma for several years. The family history was non-contributory.

Physical Examination.—The patient was very listless and resented being disturbed. He was slightly obese and showed no evidence of recent loss of weight. The skin was moist and clammy. There was no evidence of jaundice. It was difficult to get his mouth open wide enough to examine the throat thoroughly, but there were two carious teeth, the gums were red, swollen and spongy, and the lymphoid tissue of the pharynx was red and very edematous. The peritonsillar lymph nodes were enlarged and quite tender. Swallowing was impossible and talking difficult. Examination of the heart, lungs and abdomen revealed nothing abnormal.

The urine showed one plus albumin. The daily blood counts and treatment will be shown by *Chart II.*

Course in Hospital.—Two days after admission he complained that the enema tube was very painful to his rectum. The rectal mucosa was very red and on digital examination he complained of extreme pain. Two days later a perirectal abscess was forming. After two more days the abscess was drained. It will be noted on the chart that coincident with the development of the abscess the leucocytes increased and after drainage their number decreased. The role of the abscess is a matter for conjecture. The condition of the patient rapidly improved and four days later he resumed his trip to Florida.

Case 3.—L. H., single, age 52, a nurse, had been under observation of one of us (C. C. H.) intermittently for about two and one-half years. During this time she had been unable to work because of headaches, pyelitis in a remaining kidney and mild nephritis. Three months before the illness under discussion, she began to have arthritis in the knees and fingers. Six weeks previously, eleven teeth were extracted with the hope of relieving the arthritis. Following the extraction the joint pains diminished, but her gums were extremely sore for several days. One month previously she had what was thought to be an attack of influenza which lasted three weeks. On April 9, she had a chill, temperature of 103° and sore throat. Examinations revealed only a slight redness of the pharynx. Four days later she was admitted to the hospital for treatment. Sore throat, headache and fever were her principal symptoms. The leucocytes at that time numbered 3,500, of which 35 per cent were polymorphonuclears and 65 per cent lymphocytes.

Shortly after entering the hospital she had a profuse night sweat, her temperature returned to normal, the throat improved and she was permitted to go home. Five days later she was taken suddenly with chill, severe nausea, vomiting and fever. She was readmitted

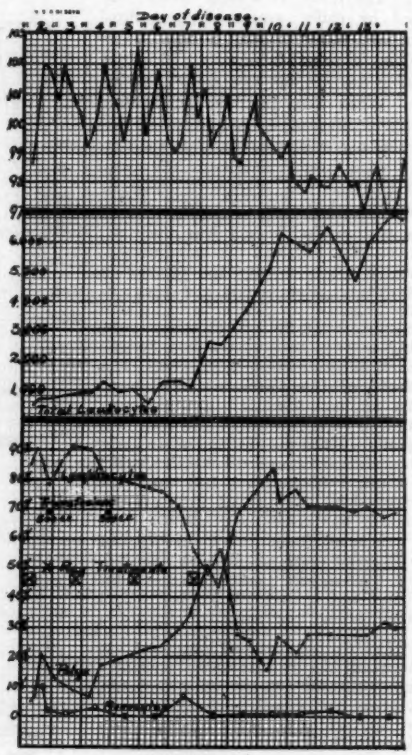
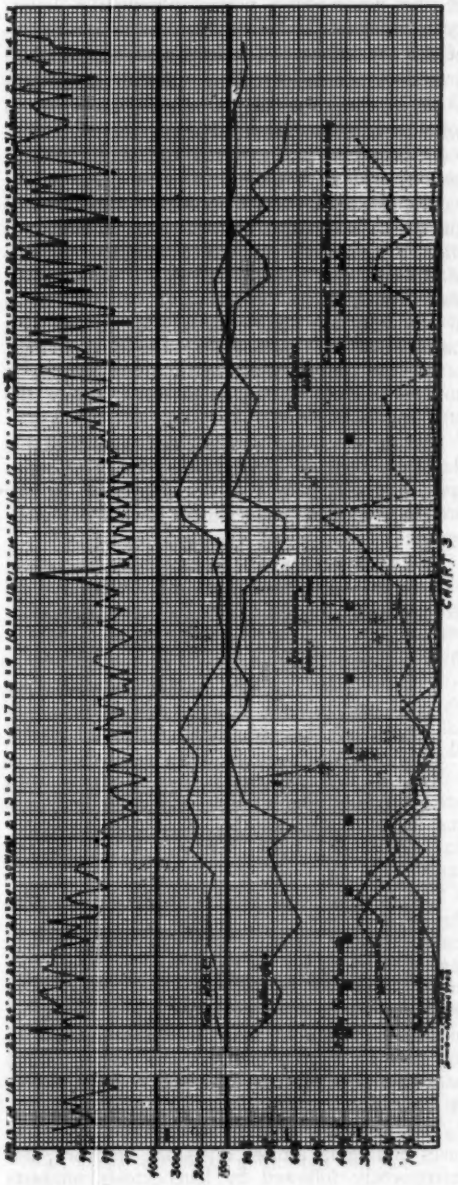


CHART 2.

to the hospital April 23. Friedman's plan of x-ray treatment was started immediately. On admission she had a painful necrotic ulcer about 1.5 cm. in diameter just back of her right upper canine. The pharynx and palate, which were only slightly inflamed on admission, became progressively more so for five days, but ulceration which seemed almost inevitable at that time did not occur. Prostration and sleep-sweats were moderate. The temperature and daily blood counts are shown in *Chart III*.



The patient showed a slight increase in total leucocytes following the transfusions shown in *Chart III*, but nine days after the second transfusion the total count had dropped to 800. A third transfusion was given, but apparently without benefit. The list of available donors had been exhausted in an effort to secure blood that would match. Thinking that convalescent blood might be helpful, we secured blood from *Case 1*, but it did not match. Whole blood from her, however, was given in 30 c. c. injections intramuscularly every second day. After three injections had brought no response, this was discontinued. The patient was now having a temperature above 101° each day. She complained of pain in the rectum and vagina, though no lesions could be found. Red, indurated areas appeared at the site of hypodermic injections, but no pus formed. From this time on the condition of the patient gradually became worse. She refused food and took liquid reluctantly. Death occurred on the forty-fourth day of her illness. Jaundice appeared seven days before exitus. No polymorphonuclear leucocytes were found in films made daily the last twenty-four days of her illness. The cells which we classified as myelocytes were variable in size, with round or oval, relatively large, nuclei. The cytoplasm was rather coarsely granular, the granules taking the stain of the nuclei. Films were submitted to Dr. Edna H. Tompkins, of the Department of Anatomy, Vanderbilt University, who classified these atypical cells as probably lymphocytes. Autopsy was refused.

A composite clinical picture of the condition would not be possible, as there are too many contradictions in the cases reported. *Chart IV*

Average Age	Male	Female	Died	Recovered	Average Low W.B.C.	Terminal Pneumonia
41 yrs	25	71	71	25	1,450	17

Sore Throat	Cervical Adenitis	Jaundice	Enlarged Spleen	Enlarged Liver	Anal Ulcers	Vaginal Ulcers
76	25	19	5	5	10	4

CHART 4.

gives the frequency of the most common findings as gathered from 96 case reports found in the American literature. Usually the past history is unimportant unless it reveals a recognized attack of agranulocytosis. Occasionally the patient may have felt tired and weak for a short period, but frequently the onset is sudden. Fever, often with one or more chills, is moderately high and continuous. Headache, chiefly frontal, may be intense. The pulse is rapid and weak and the patient is obviously overwhelmed by the illness. Gingivitis and pharyngitis may be initial symptoms or they may develop during the early stages. They are, characteristically, at first congestive, then progressively membranous, ulcerative and necrotic. A number of cases have followed rapidly upon the ex-

traction of teeth. Dysphagia is frequent. Nausea, vomiting and right upper quadrant tenderness are not rare. Mild jaundice is reported in approximately 50 per cent of the cases. Diarrhea may occur and rectal pain may be severe if ulceration takes place at this site. Vaginal lesions, similar to those in the oral and rectal cavities, are not unusual. Even necrotic patches in the skin are seen. It has been necessary to enlarge Schultz's original description, as cases have been reported with hemorrhagic lesions and with considerable anemia. The *sine quo non* for the diagnosis is the leucopenia (from 5,500 to 100) and the absence or marked decrease in the granular leucocytes. The course of the disease is usually rapidly downward, death occurring most frequently about the sixth to the eighth day.

From the pathologist's point of view the interesting findings are the absence of any evidence of leukemia; the normal bone marrow except for the scarcity of granular cells; the absence of granulocytic infiltration about the lesions, even in the lungs. The essential lesion seems to be in the granular chain of development just after the division from the lymphoblastic chain, though it usually damages that branch of the family to a less extent.

It is on the questions of etiology and the essential nature of the process that there is marked division of opinion. In a large percentage of the case reports the blood was not examined until several days after the onset.

Drueck,[10] however, quotes Hunter, Bantz, Ehrmann and Preuss as having noted patients who developed the picture while under observation for unrelated conditions, the characteristic blood changes preceding the clinical disease. Roberts and Kracke[11] had an unusually fine opportunity of observing the same sequence in a second attack following one month after the primary attack. Tokue and Yosumotu[12] believe that the picture is the result of a special form of sepsis and quote the following authors as holding the same view: Zadek, Feer, Louter, David, Ehrmann, Preuss, Chiari, Redlich, Hirsch, Holm, Gamna, Zilkowsky, Bix, Rosenow, Jagic, Dwyer, Helvig, Flanden. They further report that the following writers consider agranulocytosis a definite disease: Schultz, Verse, Bantz, Friedman, Leon, Petri, Elkeles, Rotter, Schaeffer, Reye, Kaznelson. With this latter group are lined Jones and Potter,[13] Roberts and Kracke,[11] and Lovett[14] in America. The Japanese authors quote the following as considering it a syndrome: Roche, Mozer, Luger, Schottmueller, Kastlin, Licht, Hartmann. In this country Kopelowitz[15] agrees with this opinion. The lack of agreement is augmented by the fact that some who consider it a disease think that it is a blood dyscrasia related to acute leukemia, and aleukemic leukemia, and consider that the lesions of the skin and mucous membranes represent the invasion of pathogenic organisms made possible by the absence of granular leucocytes; while others think that paralysis of the generation of granulocytes is the result of the infection, and a few believe that endocrine abnormality is the fundamental factor.

Our opinion is that the clinical symptoms and physical findings are secondary to the decrease of the neutrophilic polymorphonuclear leucocytes, and that unknown factors are the causes of this breakdown. The leucopenia and marked granulocytopenia preceding clinical manifestations in the cases above referred to seem to force such a conclusion. It is our belief that as more recoveries are reported and studied it will become evident that the depression of the granulocytopoietic function is probably toxic in origin, as it is usually brief (though possibly cyclic). The leucocytosis that followed in the case of Roberts and Kracke, and in one of our own, shows quick return of this function. The sense of recovery was almost as striking in our own cases when the granulocytes began their rise, before the angina was greatly improved, as is noticeable with a pneumonia crisis, before the lung begins to clear.

The great variety of the cases now available for study seem to preclude the theory of endocrine origin that was earlier suggested by the preponderance of females at or beyond the menopause.

The occurrence of the granulocytopenic blood picture in septic conditions other than typical agranulocytic angina shows that the bone marrow may react to such infections in a manner indistinguishable from that symptom complex.

It is well known that certain chemical or physical agents such as neoarsphenamine, benzol, thorium, x-rays and radium produce a similar blood picture.

The fact that the same patient may react with leucocytosis on one occasion and agranulocytosis and leucopenia on another, eliminates an essential, permanent bone marrow defect as the cause.

The evidence that the blood picture precedes the development of the angina in a number of cases suggests strongly that the clinically observable lesions are the result and not the cause of breakdown of the protective mechanism. In the cases which show evidence of the formation of granulocytes after the clinical development of the case it is probable that the agent which paralyzes this function has simply been slower in its action.

The comparatively brief duration of some cases ending in almost crisis-like recovery, not infrequently followed by leucocytosis, suggests

that this agent is a toxin of biologic origin which can be neutralized by serologic processes.

The presence of a comparatively normal red blood cell picture eliminates aplastic anemia with leucopenia and terminal infection in the typical case. The agranulocytic picture and terminal infection in aleukemic lymphatic leukemia probably cannot be differentiated except by the pathologist.

The increasing volume of case reports of agranulocytic angina convinces us that it is not a rare condition, and this conclusion makes it encumbent that we look for it, study the cases and search for effective therapy. While it taxes our credulity to believe that one-twentieth skin unit of x-ray exposure over the long bones can conquer such a powerful opponent as this disease, the fact remains that a good percentage of the recoveries were so treated and a large majority of the fatalities did not have this form of therapy.

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PREOPERATIVE AND POSTOPERATIVE DIETARY MANAGEMENT OF PEPTIC ULCER PATIENTS*

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There can be no routine diet and no fixed period of time required to prepare an ulcer patient for operation. Each case presents problems that have to be worked out to meet the nutritional requirements of the individual under treatment. The well-nourished ulcer patient, without gastric retention, and with a normal or high degree of free hydrochloric acid in his stomach contents after a test breakfast, requires very little or no preoperative preparation. For breakfast and dinner the day preceding operation he may have soft diet, with no meats and restriction of fats; and for supper, one or two crackers, or a piece of toast with jelly or honey, and a glass of skimmed milk or buttermilk. No butter, cream or other fats should be given to any patient for twenty-four hours before a gastric operation.

It is advisable for even the well-nourished patient to have at least 3000 c.c. of fluid during the twenty-four hours preceding a gastric operation; and the nurse in charge should be instructed to see that he gets as much water and other fluids as that. The fluid intake should be

*Read in Section on Gastroenterology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

charted, recording the time and amounts of water, dextrose orangeade, dextrose lemonade, skimmed milk or buttermilk, or other fluid; and the surgeon should know that the patient has had approximately 3000 c.c. of fluids during the twenty-four hours before operation. No food, not even milk or strained orange juice, should be given the morning of the operation, and drinking water should be stopped at least four hours before the patient is carried to the operating room.

It is unnecessary to wash out the ulcer patient's stomach before operation if the x-ray shows no gastric retention, and if the gastric acidity curve is normal, or high; because it has been shown that the normal amount of free hydrochloric acid in the gastric contents will render sterile the few cubic centimeters of fluid found in the fasting stomach. No purgative or laxative of any kind should be given within one or two days before operation, because they remove fluids from the blood and predispose to postoperative ileus. Enemata of a pint to a quart of plain tap water may be given once or twice a day, one or two days previous to operation. If the plain water enema is not effective in emptying the colon, two ounces of glycerine to six ounces of water may be given as an enema once or twice a day. On the morning of the operation a plain warm water enema may be given at least two or three hours before the patient is carried to the operating room.

Preoperative Preparation of Ulcer Patients with Gastric Retention.—Many ulcer patients do not come to operation until they have suffered for many years from repeated exacerbations of a very chronic condition, which disturbs nutrition, not only by absorption of the toxic substances resulting from infection, but by actual starvation and dehydration because of weeks or months of gastric retention from pylorospasm, or actual pyloric obstruction. Dehydration and starvation predispose to postoperative acidosis, alkalosis and infection; therefore the important indications in the preparation of the ulcer patient with gastric retention for operation is the free use of fluids and soluble carbohydrates.

The time required for the preparation for an elective operation on an ulcer patient with gastric retention cannot be fixed because it depends upon his state of nutrition and his vitality as to whether or not he can survive a serious abdominal operation. Not less than three or four days should be required in the fairly well-nourished patient with retention; and from one to three weeks are necessary in preparing the emaciated, anemic and dehydrated patient with gastric retention of over 50 per cent six hours after the barium meal.

Lahey[1] is emphatic in stressing the need for preoperative preparation of the ulcer patient. He says:

"One of the most important considerations in dealing with patients having gastric or duodenal ulcers in whom surgery is contemplated is the realization that any operation for gastric or duodenal ulcer may prove to be a long and shocking one, and that a period of preparation with plenty of fluids, glucose and transfusion may play a considerable part in bringing the ordeal to a successful conclusion."

Moynihan[2] in discussing the preparation of ulcer patients for operation says:

"His capacity to stand an operation is gauged, and if it proves weak we endeavor by all means in our power to fortify it. Glucose is given by the mouth, and by the rectum continuously in 15 per cent solutions, with carbonate of soda, never with salt. A direct transfusion of blood may be given once or oftener. In cases with great obstruction where the tissues are parched and desiccated, and a fear of acidosis after operation may be entertained, an intravenous infusion with carbonate of soda, with or without glucose, is found helpful. If a patient is profoundly ill, these measures may be followed by a rest in one of our convalescent hospitals in the country for two or three weeks before the operation."

Fluids and Soluble Carbohydrates Before Gastric Operations.—Soluble carbohydrates may be given freely, but no protein foods should be given for twenty-four hours before operation in the ulcer patient with pyloric obstruction because water passes out of the stomach slowly during gastric digestion, and there may be retention of food and fluids in the stomach if milk or any other food containing protein is given. Fats are retained in the stomach even longer than proteins, and an excess of fats is a cause of acidosis. Therefore, no fats should be given to ulcer patients for at least twenty-four hours before operation.

Strained lemon juice, one ounce, to five ounces of a ten per cent dextrose, or glucose solution makes delicious lemonade; or strained orange juice, two ounces to four ounces of a ten per cent glucose or dextrose solution (orangeade) may be given in six ounce feedings every hour during the day, and every two or three hours at night if the patient is awake up to within six hours of the operation. This will give the patient from 250 to 300 grams (1,000 to 1,200 calories) of glucose and about three litres (six pints) of fluid in the twenty-four

hours. If the dextrose or glucose solution cannot be retained by mouth, it should be given by hypodermoclysis in a five per cent dextrose, or glucose solution, or intravenously in ten per cent solutions in quantities of from 500 to 1,000 c. c. every four to six hours. Intravenous dextrose or glucose solutions, properly prepared and properly given, often save the lives of patients before and after gastric operations.

The "intravenous drip" (Matas[3]), called "venoclysis" by Hendon,[4] is considered by many surgeons as the most satisfactory method of administering glucose solutions and other fluids before and after operations. A vein, usually the median basilic, is dissected out, a cannula is introduced and held *in situ* by adhesive strips. Hendon[4] has devised a special cannula for venoclysis. The arm is fixed by a splint. The cannula is left in the vein for three or four days, and fluids are administered as often as indicated. The vein usually becomes occluded in three or four days so that if glucose solutions have to be continued another vein is opened. The cannula is attached to a Murphy drip outfit, the solution being kept warm by a hot water bottle wrapped and tied around the tube near the cannula. Gamble[5] has used the "intravenous drip" almost as a routine, sometimes before and always after operations for peptic ulcer since 1924, and finds it the most satisfactory method of administering glucose. He usually administers 500 to 1,000 c. c. of a ten per cent dextrose solution at the rate of 150 drops per minute, requiring one to two hours for the solution to enter the circulation. Gamble states that since using this method surgical shock and acidosis have been eliminated in the handling of all grave surgical risks. He further states that he never has reactions following this method of administering glucose intravenously.

There are few hospitals in the United States that are properly equipped to prepare their own dextrose or glucose solutions, and most of the reactions following intravenous glucose solutions are due to faulty technic in its preparation. Therefore, it is best to use the ampules, prepared by reliable pharmaceutical houses, containing 50 grams of dextrose, the contents of which added to 500 c. c. of double distilled water will make a ten per cent solution, or if added to 1,000 c. c. of distilled water will make a five per cent solution. If the patient is very weak not more than 500 c. c. of a ten per cent solution should be employed, because there is danger of overloading a feeble heart. The intravenous dextrose solution should be given very slowly, requiring at least twenty minutes to introduce 500 c. c. of a ten per cent solution into the vein through an 18 gauge needle.

The Futility of Giving Glucose or Dextrose Solutions by the Rectum.—Dextrose or glucose solutions when given by the rectal route are of questionable value. Having observed flatulency and abdominal discomfort in a number of our operated ulcer cases that we thought were due to the use of glucose and water by the Murphy drip, we request the surgeons who operate for us to spare the rectum and colon except for plain water enemata. Recent studies seem to prove that very little, if any, dextrose or glucose is absorbed from solutions given by the rectum. From experimental and clinical studies by McNealy and Williams,[6] Pressman,[7] deTakats[8] and Schmidt and Cary[9] it seems that the use of glucose or dextrose solutions not only is futile, but may be actually harmful to the ulcer patient either before or after operation. Apparently American surgeons are discontinuing the use of proctoclyses of all kinds after gastric surgery, because as Strauss[10] says they "prefer to keep the intestines at absolute rest."

Water and Salt Solutions per Rectum.—Trout[11] years ago protested against the then indiscriminate postoperative use of salt solutions per rectum, because he considered that an excess of salt in the blood and tissues of the body may be actually harmful to the surgical patient. Instead of the salt solutions he advised the liberal use of tap water per rectum. Unquestionably the normal salt solution may be partly or wholly absorbed through the colonic mucosa, and if too much is given, particularly to the patient with damaged kidneys, as may occur in the neglected cases of gastric or duodenal ulcer, the sodium-calcium-potassium balance of the blood is disturbed, and the excess of salt in the tissues may cause edema of the lungs and other parts of the body from water retention.

It may be best to discontinue the use of the so-called normal salt solution altogether before and after gastric operations except where carefully checked laboratory studies of the blood show a low salt content as in alkalosis and in intestinal obstruction. It would seem rational to use instead not more than 1,000 c. c. a day of Ringer's solution which combines sodium, calcium and potassium in the same ratio as in the

normal blood. The Ringer's solution may be given with glucose either subcutaneously, intravenously, or via the rectal route.

In a very timely article on the dangers of the surgeon's order to "push fluids," deTakats[8] calls attention to "the fear of dehydration that has swept the country." DeTakats thinks that 3,000 to 4,000 c. c. in twenty-four hours is as much fluid as any patient should have before or after any operation; and that where there is myocardial damage, or kidney insufficiency or both, the fluid intake should be reduced very materially. The dehydrated, emaciated ulcer patient often has some cardiorenal damage and a weak heart may fail, and poorly functioning kidneys may allow water retention with the symptoms of what Rountree[12] calls water intoxication if an excessive amount of fluids is given.

Certainly the safest and the most accurate methods of administering dextrose solutions, Ringer's solution and saline solutions before or after operations are subcutaneously and intravenously. The rectum should not be disturbed except to give plain water enemata, not more than 1,000 c. c., once or twice a day before and after operations. If the patient cannot take fluids by mouth and one feels that he must give fluids by the rectum before or after an operation, undoubtedly the safest, surest and most comfortable method is the use of from 200 to 300 c. c. of warm tap water by enemata, given slowly through a soft rubber catheter, every two or three hours.

Transfusions.—Transfusions in preparing the undernourished, dehydrated, anemic ulcer patient for operation are of inestimable value. A transfusion of from 250 to 500 c. c. of blood provides the recipient with much needed nourishment, as well as other vital ingredients needed to carry him over the crisis of an operation. If the patient is very anemic and emaciated, one or more transfusions before and after operation may be a life-saving procedure. Undoubtedly transfusions are not employed as often as they are needed in the preparation of ulcer patients for operations.

POSTOPERATIVE DIETARY MANAGEMENT

In dieting after gastric operations the state of nutrition of the patient, the ulcer pathology, and gastric physiology should be considered. A distinguished surgeon is credited with saying that no patient who cannot survive a week's starvation should submit to a gastric operation. It is certainly true that the amount of food that can be given safely to a patient for the first week after gastric operation amounts to only a fraction of what he will metabolize during that time. He therefore must depend largely upon his own tissues (endogenous katabolism) for sustenance. The reserve glycogen in the liver, muscles and other tissues will be utilized first, then the fats will be burned and finally the proteins will be katabolized.

Subcutaneous and Intravenous Dextrose Therapy.—One thousand c. c. of a five per cent glucose solution given by hypodermoclysis every eight hours after operation will give the patient 150 grams of glucose (600 calories) in twenty-four hours, sufficient carbohydrates to insure proper metabolism of the patient's endogenous fats, thus preventing acidosis. If the patient is vomiting or if he is very weak for the first two or three days after a gastric operation, it may be best to alternate with or substitute for the subcutaneous dextrose solutions 500 to 1,000 c. c. of a ten per cent dextrose solution intravenously.

Glucose or dextrose should not be given subcutaneously in over five per cent solution because of the pain produced by the more concentrated solutions. It may be given in ten per cent solution intravenously provided it is given very slowly. The use of glucose solution by hypodermoclysis should be regarded as a minor surgical operation and it should be given under strict aseptic precautions, by the surgeon himself or by a well-trained intern. No nurse should ever be trusted to give glucose solutions by hypodermoclysis any more than she should be trusted to amputate a finger or perform other minor surgical operations.

The infections that sometimes follow the use of glucose subcutaneously may be due to faulty technic by nurses and the procedure is not without other dangers. A surgeon once ordered a nurse to give one of my patients a five per cent glucose solution under the breasts. I was called hurriedly to see the patient because she was coughing up large quantities of a bloody fluid. The nurse had introduced the needle into the lung and the patient had received at least 600 c. c. of a five per cent glucose into her right lung which nearly caused the death of a lovely, useful woman. An intern in a great teaching hospital, in attempting to give glucose by hypodermoclysis under the breast plunged the needle

into the lung. The patient was nearly drowned before the mistake was discovered. Such accidents show the necessity for care in the administration of any solution by hypodermoclysis.

Intravenously administered ether by the needle or by the continuous drip (venoclysis) method should be given by the surgeon himself or by a well trained assistant, with the same meticulous aseptic technic as the performance of a major operation. Unquestionably some of the dangerous reactions that have occurred after intravenous dextrose feedings are due to faulty technic in administration, but improperly prepared solutions often account for such accidents.

The urine of the postoperative ulcer patient should be examined for sugar and diacetic acid once or twice a day, and blood sugar determinations should be made at least once a day in serious cases. If the carbohydrate tolerance is proved to be low and if there is diacetic acid in the urine, ten or twenty units of insulin given hypodermatically may save the patient from acidosis.

Water and Food by Mouth After Ulcer Operations.—Surgeons differ as to when water may be given by mouth after gastric operations. Since water passes out of the stomach in a few minutes when it contains no food, it would seem that after twenty-four hours no harm could be done by giving a few sips, one or two teaspoonfuls, of either hot or cold water every one or two hours during the day, increasing it on the third and fourth days to two ounces, and to three ounces on the fifth day. Certainly the sooner the patient can get his daily quota of water by mouth, without distention of the stomach, the better it is for him. The amount of water and other fluids retained should be recorded every day, reducing the subcutaneous and the intravenous use of dextrose solutions and the water per rectum as the patient can take more fluids by mouth.

Gastric physiology as well as the operative wound and the state of nutrition of the individual should be considered in dieting the ulcer patient after the operation. Gastric secretion and motility are increased by giving proteins. It therefore would seem advisable to give no food requiring gastric digestion for a week, or even longer, after operation. Protein digestion is associated with gastric peristalsis, and if milk or other food containing protein is given before the gastric wound has healed, the principal of surgical rest is violated. Friedenwald[13] and Finney[14] do not allow milk for the first week after operation. Jaratsky[15] objects to giving milk after gastric operations as being "unphysiological and illogical," because milk excites gastric secretion and the first step in the digestion of milk is coagulation with the formation of a solid mass of curds, which require gastric peristalsis and gastric secretion for digestion.

Fats surely are not indicated for the first week after operation because of the danger of acidosis and also because fats remain in the stomach longer than other foods, and if they are given too soon after operation the stomach may become overdistended with the accumulation of food and fluids.

The soluble carbohydrates meet the nutritional needs of the ulcer patients for the first few days after operation, and also give physiological rest to the stomach. One part strained orange juice to two parts of ten per cent glucose or dextrose (glucose or dextrose orangeade) in half ounce feedings every two hours may be given on the third day, and increased to two ounces on the fourth and three ounces on the fifth day. Tea may be substituted for the dextrose orangeade in proportion of a teaspoonful of strained lemon juice and three grams of dextrose (corn sugar) to the ounce of weak tea. The danger of acidosis usually will have passed before the end of the first week after operation; and during the second week the patient may have three small meals a day, consisting of oatmeal and other cereals, with cream, white bread toast, one egg for breakfast and supper, pureed vegetables for dinner, with frequent feedings between meals and if awake at night of tomato juice, strained orange juice, dextrose orangeade, dextrose lemonade, or gingerale. No milk and no meats are given during the second week.

During the third week the diet should be more nutritious and milk, scraped beef or minced chicken are added, but the quantities of each article of food should be specified and a prescribed diet should be given; because it should be remembered that while the gastroenterostomy or gastric resection wound usually heals within fourteen days, the union cannot be said to be firm, and over-distention of the stomach should be avoided. In discussing postoperative treatment Eusterman[16] brings out this point forcefully in the following paragraph:

"Flint has shown in animals that the new formed anastomosis is the site of a healing ulcerated surface for

about two weeks. Clinical experience repeatedly demonstrates that ulceration in the suture lines, regardless of the type of operation, or at the gastrojejunal orifice, may appear shortly after operation. An intact gastric mucous membrane can tolerate much abuse, but in the presence of ulceration or during the healing process a proper regimen may determine the ultimate success or failure of the surgical procedure."

Likewise it should be remembered that following a gastroenterostomy the original ulcer has not healed at the end of one or two weeks and much of the food still passes over the ulcer-bearing area of the duodenum. Therefore, it is absurd to "take the bridle off and let the gastroenterostomy patient eat what he wants two weeks after his operation."

The diet after the third week should be as nutritious as possible and may conform much to the plan of the well balanced rich vitamin diets as employed in the medical treatment of ulcer (Harris[17]).

A conservative estimate of the time required for a gastric or duodenal ulcer to heal, whether treated surgically or medically, is from six weeks to two or three months; and the patient should be impressed with that fact and dieted accordingly. Bolton[18] thinks that it may take a year for an ulcer to heal, even after a gastroenterostomy.

It is true that at the end of two weeks after an operation for ulcer the average patient feels well, he usually is hungry, and he feels that the surgeon has "cut out" the ulcer or the cause of his trouble, just as an appendectomy forever removes the hazard of another attack of appendicitis. The busy surgeon too often neglects to inform his gastroenterostomy patient of the fact that he has not "cut out" the cause of his trouble, that neither he nor anyone else knows the actual cause of his ulcer, and that if he would avoid a recurrence of his ulcer he must eat rationally and live moderately.

Lahey,[19] who perhaps has had as large a personal experience in gastric surgery as any man in the world, has strong convictions regarding the medical after-care in operated gastric and duodenal ulcer cases. The following paragraph is quoted from an article by him:

"Any unprejudiced person must admit that a patient who has had an ulcer, whether operated on or not, is always a possible candidate for another ulcer, and that those patients who have submitted to surgical procedures for ulcer, no matter what the type, are less likely to have recurrent ulcers and more likely to have better end-results when placed on just as careful post-operative medical management as if they had not been operated upon, and when urged to modify their habits of life just as much as they would if placed on non-operative medical management."

Likewise Sullivan,[20] Finkelstein,[21] Kruse,[22] Ralph Brown,[23] Patterson,[24] Rowlette[25] and other surgeons stress the need for medical supervision of patients who have been operated upon for peptic ulcer.

There are many articles in medical literature calling attention to recurrences and marginal ulcers after operations for gastric and duodenal ulcers. Eusterman,[26] Bastedo,[27] Smithies,[28] VanderHoof,[29] and others too numerous to mention, believe that inadequate dietetic and medical treatment is responsible for many failures in gastric surgery.

The wise surgeon will turn the feeding of his operated ulcer patients over to an experienced gastroenterologist or internist for dieting after the first two or three days, and when he dismisses the patient surgically he will admonish him to follow the diet prescribed for him for at least six months; and for the rest of his life to have a semi-annual physical examination, with particular attention to the gastrointestinal tract.

Tom Brown[30] once remarked:

"The personality of the physician has much to do with his success in treating ulcer. The physician who can impress the ulcer patient with the necessity for sticking to his diet and living a hygienic life will get the best results in treating ulcer."

Likewise the conscience and the personality of the surgeon have much to do with the end results of his ulcer operations. If he realizes that his duty to his operated ulcer patient does not end with the healing of his wound; and if he will take the time to impress upon him the necessity for moderate hygienic living for the rest of his life, he will cure more of his ulcer patients than if he lets them go home two or three weeks after operation with haphazard instructions about the diet and personal hygiene.

The convalescent period following an operation is a good time to teach the ulcer patient the personal hygiene adapted to his particular needs (Harris[31]). He should be carefully questioned about his eating and living habits and if they are faulty he should be taught to correct them. The ulcer patient should be taught the necessity for thorough mastication of food and while in the hospital he should be required to eat slowly and learn to enjoy eating, not altogether what he wants, but the foods that are best for him. "Eternal vigilance is the price of liberty" and regular systematic living for a long time is the price for the enjoyment of health and life for the patient who has had an operation for gastric or duodenal ulcer.

A SIMPLIFIED POSTOPERATIVE ULCER DIET

It is not possible to construct a diet that may be used in every ulcer case that has been operated upon any more than a routine diet can be used with every ulcer patient treated medically, but we have prepared a diet that will meet the nutritional needs of the average postoperative patient, while at the same time taking into consideration the ulcer pathology and gastric physiology involved. It may be modified to suit the indications in the individual case. Copies are given to the resident surgeon, or surgical intern, the nurses and the hospital dietitian with instructions to change the orders only with the approval of the surgeon or the associated physician.

If there is retching and vomiting at any time after operation, discontinue everything by mouth for four hours; and if at the end of that time the nausea has subsided, the water and glucose feedings may be resumed. If the nausea and vomiting persist after four hours, particularly if the pulse rate is high, and there are evidences of gastric retention, or of acute dilatation of the stomach, gastric lavage, using a sterilized stomach tube and sterile water, is indicated. Balfour[32] and W. J. Mayo[33] insist that at any time after operation if the pulse becomes rapid, or if there is any nausea, or even a suspicion of gastric retention, there should be no delay in passing the stomach tube, because it is important to prevent distention of the stomach. Care should be taken not to introduce too much water at a time in gastric lavage after ulcer operations. Since morphine, codeine, pantopon or other narcotics cause vomiting with some patients, they should be discontinued, or reduced to the minimum amount required to relieve pain as soon as possible after operation.

First Twenty-four Hours.—No food or water by mouth. Two hundred fifty c. c. plain warm water by slow enema every two hours. If the patient is vomiting, or in shock, or if there is diacetic acid in his urine, 1,000 c. c. of a five per cent dextrose solution is given subcutaneously every eight hours. Five hundred c. c. of a ten per cent dextrose solution intravenously may be substituted for the subcutaneous dextrose once or twice a day. Water per rectum should be regulated so that the patient does not get more than 3,000 to 4,000 c. c. of fluid a day.

Second Day.—No food. Begin with one teaspoonful hot or ice water by mouth every hour. If no nausea, increase water to four teaspoonsful every hour, day and night when awake. Fluids and dextrose solutions subcutaneously, intravenously and per rectum as for first day.

Third Day.—Two ounces (60 c. c.) cool water every two hours day and night when awake. Two ounces ten per cent glucose lemonade, or glucose orangeade, at 7:00 and 10:00 a. m., 1:00, 4:00, 7:00 and 11:00 p. m. and 4:00 a. m. May substitute two ounces (60 c. c.) weak strained tea for 7:00 and 10:00 a. m. and 1:00 p. m. glucose solution. If fluids are retained by mouth reduce the glucose or dextrose solutions by 500 c. c. and water per rectum by 500 to 1,000 c. c.

Fourth Day.—Three ounces (90 c. c.) cool water every two hours when awake day and night, alternating with three ounces (90 c. c.) of weak tea with one teaspoonful sugar (without cream); or three ounces of a ten per cent glucose lemonade, or glucose orangeade, or three ounces of gingerale. Tea may produce wakefulness if given after 4:00 o'clock in the afternoon, particularly when given to one who does not ordinarily drink tea or coffee. The water by proctoclysis and glucose solutions by hypodermoclysis, or intravenously, may be discontinued on the fourth day if the patient can take fluids by mouth; but if nausea and vomiting persist, they should be given as on the first day.

Fifth Day.—Water and the ten per cent glucose lemonade, or glucose orangeade, or grape juice, or gingerale may be increased to four ounces and given every hour and a half, the water alternating with the tea, glucose solution, grape juice or gingerale every three hours.

Sixth Day.—Water should be given freely between feedings, not over four ounces (120 c. c.) at a time. One egg albumen and three ounces of ten per cent glucose lemonade, or glucose orangeade, or four ounces gingerale every two hours from 8:00 a. m. to 7:00 p. m. and every three or four hours at night if awake.

Seventh to Tenth Days.—7:00 a. m., breakfast: three ounces strained orange juice; four tablespoonsful of strained oatmeal gruel, with two ounces cream; one soft boiled egg; one slice white bread toast with crust trimmed off, and one pat butter.

10:00 and 11:00 a. m.—Five ounces (150 c. c.) dextrose orangeade, or five ounces gingerale.

12:00 m., Dinner.—Three ounces (90 c. c.) puree of peas, beans or potato; one slice of white bread toast and one pat butter; two rounded tablespoonsful of plain jello or ice cream.

3:00 and 5:00 p. m.—Five ounces strained tomato juice, or five ounces dextrose or glucose orangeade, or five ounces gingerale.

6:00 p. m., Supper.—Three ounces strained orange juice; four tablespoonsful strained oatmeal and two ounces cream, no sugar; one soft poached egg on white bread toast, and one pat butter.

9:00 p. m. and at 1:00 and 2:00 a. m., if awake.—Five ounces strained tomato juice, or five ounces of dextrose or glucose orangeade, or five ounces gingerale.

Eleventh to Fourteenth Days.—7:00 a. m., Breakfast: three ounces strained orange juice; six tablespoonsful of strained oatmeal, with two ounces cream; one soft boiled egg; one slice white bread toast with crust trimmed off, and one pat butter.

10:00 and 11:00 a. m.—Five ounces (150 c. c.) dextrose orangeade, or five ounces gingerale.

3:00 and 5:00 p. m.—Five ounces strained tomato broth, or strained vegetable soup, or creamed soup; one slice of white bread toast and one pat butter; two rounded tablespoonsful of plain jello or ice cream.

3:00 and 5:00 p. m.—Five ounces strained tomato

juice, or five ounces dextrose or glucose orangeade, or five ounces gingerale.

6:00 p. m., Supper.—Three ounces strained orange juice; six tablespoonsful strained oatmeal, or cream of wheat, and two ounces of cream, no sugar; one soft poached egg on white bread toast and one pat of butter.

9:00 p. m. and 1:00 or 2:00 a. m., if awake.—Five ounces strained tomato juice, or five ounces of dextrose or glucose orangeade, or five ounces gingerale.

Fifteenth to Twenty-first Day.—7:00 a. m., Breakfast: three ounces strained orange juice or strained grapefruit juice; six tablespoonsful strained oatmeal, cream of wheat or other smooth cereal; three ounces cream; one soft poached or soft boiled egg; one slice toast, whole wheat bread, and two pats of butter.

10:00 a. m.—Five ounces milk (half cream).

12:00 m., Dinner.—Four ounces strained tomato juice or strained vegetable soup. Four rounded tablespoonsful scraped beef or minced breast of chicken; four rounded tablespoonsful tender green vegetables, as turnip greens, spinach or string beans (mashed through a sieve); one slice whole wheat bread toast; two pats butter; one rounded tablespoonful ice cream, cup custard, boiled custard, or gelatine and cream.

3:00 p. m.—Five ounces milk (half cream).

6:00 p. m., Supper.—Four ounces thick puree of peas or beans; four tablespoonsful tender green vegetables as turnip greens, spinach or string beans mashed through a sieve; one slice whole wheat bread toast; two pats butter; five ounces milk; three ounces strained orange juice.

9:00 p. m.—Five ounces milk (half cream).

Fourth, Fifth and Sixth Weeks.—8:00 a. m., Breakfast: three ounces strained orange juice; six tablespoonsful strained oatmeal, or one shredded wheat biscuit, or other cereal (no bran); three ounces cream; one egg, soft boiled, poached or scrambled; one slice dry toast, whole wheat bread; two pats butter.

10:00 a. m.—Five ounces milk (half cream).

1:00 p. m., Dinner.—Four ounces strained tomato juice, clear broth or tomato broth, or strained vegetable soup; four to six rounded tablespoonsful scraped beef or minced chicken or lamb; four to six tablespoonsful turnip greens, spinach or string beans, or carrots, mashed through a sieve; one slice dry toast, whole wheat bread; two pats butter; four tablespoonsful ice cream, boiled custard or gelatine, or watermelon or cantaloupe juice.

4:00 p. m.—Five ounces milk (half cream).

6:00 p. m., Supper.—Four ounces thick puree of green or dried peas or butter beans; four to six tablespoonsful turnip greens, spinach or string beans or carrots, mashed through a sieve; one slice whole wheat bread toast; two pats butter; four ounces milk; four ounces strained orange juice.

9:00 p. m.—Five ounces milk (half cream).

Diet After Six Weeks.—Breakfast: one fruit: strained orange or grapefruit or cantaloupe juice. One cereal: small portion of thoroughly cooked oatmeal, or other cereal, no bran, or one shredded wheat biscuit with one-half glass cream, no sugar. Eggs: one egg poached or soft boiled, or soft scrambled. Bread: one slice whole wheat bread toast, two or three pats butter; two tablespoonsful honey. Milk or cocoa: one glass milk or cup of hot cocoa.

Three Hours After Breakfast.—One glass milk (one-third cream).

Dinner.—Soup: strained chicken, celery, vegetable, barley soup, or strained tomato juice. Tender meats (small portion): broiled, or baked, not fried; small portion of chicken, turkey, mutton, roast beef, bacon, thinly sliced boiled ham, or fish. Tender green and yellow vegetables (one variety of each): large serving spinach, turnip greens, tender string beans, cooked without much grease; carrots, squash, or young turnips. Butter or mayonnaise or olive oil and lemon juice may be used freely on vegetables after they have been cooked. Bread: one slice whole wheat bread or dry toast, or small piece of country ground corn meal bread, or one small corn muffin; two or three pats of butter. Milk: one glass milk or buttermilk (one-third cream). Dessert: soft part of baked apple, thoroughly ripe banana or other fruit with cream, no sugar. Ice cream or gelatine, or sherbet, twice a week.

Supper.—Soup: puree (thick strained soup) of peas or beans, or oyster stew, no oysters. Raw vegetable salad: crisp lettuce (trim out tough stems); peeled tomatoes (cut out tough centers); crisp cole slaw made of leafy part of tender cabbage (cut out the stems of the leaves). Olive oil and lemon juice or apple vinegar, or mayonnaise dressing may be used freely. Two crisp crackers. Cheese: four tablespoonsful home made or dairy made cottage or cream cheese, or the equivalent of two tablespoonsful of Swiss, Philadelphia or yellow American cheese, never cooked. Bread: one slice whole wheat bread or dry toast, or six crackers. Two or three pats butter. Milk: one glass sweet milk, or buttermilk (one-third cream). Dessert: strained orange juice, soft part baked apple, or very ripe banana and cream without sugar, or gelatine, or egg custard.

There can be no doubt of the desirability of dieting the postoperative ulcer patient in a hospital for at least three weeks; and before he leaves the hospital the surgeon or the physician should be sure that he understands and can carry out written instructions regarding the diet and personal hygiene adapted to his individual needs. It is particularly important that the convalescent ulcer patient should understand the necessity for eating a sufficient quantity of a diet that is well balanced as regards proteins, carbohydrates and fats and rich in vitamins (Harris[34]). An adequate follow-up system is important after gastric operations in order to see that the patient carries out his prescribed diet and the other instructions that were given him when he left the hospital.

Sir Berkeley Moynihan[35] gives his convalescent postoperative ulcer patients printed instructions regarding their diet and living habits, which they are admonished to carry out faithfully. A copy of the following outline of a system of hygienic living (Harris[36]) with copies

of simplified diet lists prepared to suit his particular needs is given to each of our ulcer patients before he is dismissed from the hospital:

(1) *Diet.*—Three medium meals a day at the same hours and a glass of milk between meals for at least three months after treatment; then one raw fruit, one raw vegetable, two cooked tender green vegetables, a pint to a quart of milk every day for the rest of the ulcer patient's life. Meat and light desserts are allowed not more than once a day; and enough bread, potatoes, rice, butter and other simple foods to maintain the normal weight. Thorough mastication of food is very important.

(2) *Work.*—Six to eight hours of honest work a day for five days a week and three or four hours on Saturday. Avoid overwork.

(3) *Sleep.*—Eight or nine hours in bed at night; and lie down (sleep, if possible) for half an hour after the noon meal.

(4) *Exercise.*—Fifteen minutes' room exercises with windows wide open before the morning bath. Follow the bath with massage (brisk rubbing with open hand) of the entire body until the skin is reddened. A walk of one or two miles in the open air and sunlight each day, or, what is better, play golf two or three afternoons a week.

(5) *Recreation.*—Eight hours for play includes morning exercises, bath; golf or other outdoor exercises; time for eating at least one-half hour for each meal, perhaps an hour for dinner, and no work or serious reading after 6 o'clock in the afternoon. Frequent week-end trips and an annual vacation of from two weeks to a month every year.

(6) *Serenity.*—Worry, anger, grief, abnormal fears, or other emotional disturbances will break down resistance to infections. Therefore, the cured ulcer patient should cultivate serenity in all the relations of life.

(7) *Eliminate the Toxins.*—Coffee, tea and the so-called cola drinks, which contain caffeine, a habit-forming drug, should not be used by the ulcer patient, except occasionally as a stimulant after losing sleep, or as a drug for headache or shock. Tobacco and alcohol are predisposing causes of ulcer and are quite injurious to the ulcer patient. Therefore, he should never use them in any quantity, even after his ulcer has been pronounced cured.

(8) *The Annual or Semi-Annual Physical Examination.*—The ulcer patient should report to his physician once a month for six months, and then for the rest of his life have an annual or semi-annual physical examination, with particular reference to a possible return of the ulcer; or the possible development of a cancer of the stomach, which, if diagnosed early, can be cured by operation.

Each section of the above outline of hygienic living is discussed with the patient and he is shown how he can conform his daily habits to a regular systematic regimen. He is also impressed with the fact that his future health, efficiency and happiness depend largely upon his living the simple hygienic life and that he must do his part in preventing a recurrence of his ulcer.

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DISCUSSION (*Abstract*)

Dr. Ernest H. Gaither, Baltimore, Md.—Preoperative motor studies, to ascertain the emptying power of the stomach, are fundamentally important; if obstruction be present, lavage will be necessary for several days

before operation, the number of daily washings depending upon the degree of obstruction; two or three daily are sometimes necessary to free the stomach from the stagnant material which is rapidly accumulated in such cases. Some authorities advise the addition of dilute hydrochloric acid to the lavaging solution.

In cases of obstruction soft, pureed foods, watery carbohydrates and liquid nourishment should be administered until 24 to 18 hours before operation. From this time on egg albumen in fruit juice, whey, clear coffee, or glucose in weak tea or fruit juice, should be given. In preoperative management milk should be eliminated and whey offers an excellent substitute.

Bulky enemas have been discarded for enemata of glucose in a soda or saline solution, to which some authorities add a moderate amount of 50 per cent alcohol. Such enemata are easily applied, well absorbed, and aid materially in increasing the fluids vital in such cases.

In non-obstructive cases, it is advisable to lavage five hours before operation. Some clinicians add twenty drops of dilute hydrochloric acid to each quart, others use a normal saline, and still others add sodium bicarbonate to the saline, or to tap water.

Soft, bland, non irritating food should be continued until 24 to 18 hours before operation, when a change to the liquids as above suggested is indicated. Some authorities prefer a smooth, soft diet to within eight hours of operative procedure, and lavage of the stomach five hours before operation.

Sterile food for several days before operation is insisted upon by some surgeons. Others are content to have the food thoroughly cooked.

Surgeons and internists differ widely in opinion and practice in regard to the most efficacious postoperative dietetic procedure. Some insist that nothing be given by mouth for twelve hours; others consider this too radical, involving unnecessary suffering. The former group depends for relief of thirst and discomfort upon fluids applied per rectum, intravenously, or by hypodermocylsis, and narcotics hypodermically administered.

Some men do not object to the administration of small quantities of water with glucose, two to three ounces every three hours, commencing four to eight hours after operation. After twenty-four hours the amounts may be slightly increased. Fruit juices, particularly of an acid type, may not be well tolerated, and some observers allow sweetened clear tea, coffee and whey after the first twenty-four hours. Fluids should be warm or cool.

Should nausea, gas or vomiting appear, all feeding by mouth should be suspended for at least four to six hours; if the untoward symptoms still continue, lavage should be applied. On the fourth to sixth day, depending upon the reaction of the stomach to food, small amounts of watery carbohydrates, not exceeding four ounces every four hours, may be added to the fluids above enumerated; and it is best to continue this method of feeding until the twelfth to fourteenth day, after which three small meals with intermediate nourishment may be given.

Milk should be withheld in many cases until about the beginning of the second week of convalescence, at which time small amounts should be cautiously administered. Tender fowl and meats had best be withheld for at least six to eight weeks.

Dr. Julius Friedenwald, Baltimore, Md.—In preparing patients for operations on the stomach and duodenum the fact that these individuals are not uncommonly undernourished and weakened by a long-continued illness must be borne in mind. In those patients unable to consume sufficient nourishment, duodenal alimentation, or if operation becomes urgent, intravenous glucose should be administered. Before operation upon the stomach it is important that this organ be in as sterile a state as possible, as well as entirely empty. This may be accomplished by lavage of the stomach daily under sterile precautions and by feeding the patient on a sterile diet for three or four days previous to operation. Following operation in our cases, 1,500 c. c. of normal salt solution are administered by infusion. Normal salt solution and glucose and soda enemata are given at four-hour intervals, or better, continuous feeding by means of the drip method is practised. On the second day water is given by mouth in increasing amounts, egg albumen is added on the third day and gradually other liquids except milk are given. On the ninth day a soft boiled egg is added and soft diet on the tenth. On the fifteenth day a restricted light diet is allowed. This diet is maintained for the two following weeks at least. For five or six months a carefully regulated and restricted diet is maintained.

In many of our operative cases duodenal feeding is practised according to the method advised in the Clinic of Dr. J. M. T. Finney. The tube is swallowed before operation and passed from the stomach into the jejunum during the course of the operation. For two hours following operation the tube is allowed to drain out the contents of the intestine. This is then followed by feeding with a five per cent glucose solution administered by the drip method. After twenty-four hours, broth, peptonized milk and other fluids may be given through the tube. The tube may be retained for from one to five days or even longer.

As Dr. Harris has pointed out, the dietary management previous to as well as following operation for ulcer is of the greatest importance, not only in overcoming many of the difficulties at the time of and immediately following operation, but also in securing permanent cure as well.

Dr. Lloyd J. Netto, West Palm Beach, Fla.—From the surgical standpoint, I think there should be a closer relation between gastroenterologist and surgeon. When the surgical wounds are healed the case becomes one for the gastroenterologist.

There is a group of cases in which it is not possible to carry out a dietary regime preoperatively. This is the perforated ulcer case brought in as an emergency. I have had two such cases in which there was not any previous gastric distress. Both have had strict medical care postoperatively and they are well.

To emphasize Dr. Harris' remarks on the postoperative diet, I know of a young man who was successfully operated upon for ulcer. On the fourth day a thoughtless attendant served him a fine chicken dinner. His troubles started then and he has been a gastric cripple ever since.

Dr. Elmer B. Freeman, Baltimore, Md.—Careful preoperative medical treatment of patients suffering from pyloric obstruction is essential. These patients should be in a hospital for several days before operation in-

stead of being operated upon within 24 to 48 hours after entering. The diet should be carefully regulated, made up of liquids only, of high caloric value; gastric lavage should be given at bed time if the studies show much retention; blood chloride should be determined if vomiting has been a prominent symptom, and normal saline infusion should be given the cases that show evidence of insufficient fluid. After operation, "during convalescence," a soft and light diet of high caloric value is very important. The tendency is to put the patients on a regular hospital diet within 12 to 14 days. They should not have a regular diet for some weeks after operation, during which time they should continue on a soft and light diet. With careful preoperative medical care and proper dietetic management after operation, the end results in cases of pyloric obstruction will be much more satisfactory.

Dr. L. Carl Sanders, Memphis, Tenn.—The preoperative and postoperative diet in these patients is very important. It is often observed that patients with obstructing duodenal ulcers have a comparatively easy postoperative course. I am sure the reason lies in the preoperative preparation and the careful management after operation. The days of preparation with an abundance of fluids and daily gastric lavage brings the patient's resistance up toward normal.

Many patients are nauseated after operation and large amounts of fluid collect in the stomach. A Levine tube placed in the stomach and left for several days will permit the drainage of the stomach contents and will allow the giving of large quantities of fluids. This method has given happy results in our hands and we have been able to give as much as 4,000 to 5,000 c. c. of fluid daily. The failure of ulcer patients to obtain relief from surgery is often due to injudicious diet following operation. When the patient leaves the hospital he should be given written instructions concerning his diet. He should be seen at regular intervals and allowed to return to a normal diet only after months of careful feeding.

Dr. J. E. Knighton, Shreveport, La.—I agree most heartily with Dr. Harris. Most of us can look back over the past and recall patients who have had operations without proper preparation, in whom the results were disastrous.

Dr. Harris (closing).—Dr. Gaither mentioned gastric lavage before operation. The well nourished ulcer patient and the ulcer patient with a normal acidity or even hyperacidity I do not think needs gastric lavage. He is better off without that because the gastric contents are sterilized by the hydrochloric acid in the stomach. Twenty-four hours on a sterile diet is sufficient for the well nourished patient who is being prepared for a gastric operation.

One of the great difficulties in the management of these cases is the fact that for economic reasons the patients want to get out of the hospital too soon. The surgeons frequently tell them they can leave the hospital within a few days. Patients like that. I think lives will be saved if pyloric obstruction cases are given better preoperative care. No case with gastric retention for six hours and certainly none with retention for twenty-four hours should be operated upon without four or five days of preparation. Some of them will take two or three weeks, as Sir Berkeley Moynihan has mentioned and as Dr. Gaither said in his discussion this morning.

Dr. Gaither mentioned tea following operation. I think tea with glucose or dextrose, or even cane sugar, is a very excellent thing. I do not use cane sugar, as it is very prone to ferment, whereas dextrose or lactose is not so apt to ferment. Tea is given without cream or milk. Tea, containing, as it does, caffeine, is a very excellent stimulant the second or third day after operation. All those who took part in the discussion have agreed, I believe, that milk should not be given for the first week after operation.

We found in some of our cases that glucose per rectum produces flatulence. We prefer to reserve the rectum for plain tap water, that will absorb without discomfort. Dr. Friedenwald mentioned Dr. Finney's method of feeding with the duodenal tube. We have not found it necessary in any case. I think it must be rare that it is indicated. The same objection will obtain to duodenal feeding that there is to giving glucose per rectum. It may produce intestinal distention. It is much better to let the stomach and intestines rest for a few days. The postoperative care of cases of perforation is just the same as in uncomplicated ulcer. Remember that the patient is going to burn up his own fats and there will be a tendency to acidosis unless you give him glucose to burn them. You should never forget the principle in dieting an ulcer patient before and after operations that "fats burn in the fire of the carbohydrates" and unless dextrose or other carbohydrate is given before and after operation the patient is apt to have an acidosis from the endogenous metabolism of fats.

Dr. Freeman's discussion as to postoperative care particularly is most important. The dictum of some surgeons who are widely quoted as saying: "Take off the bridle about foods two weeks after operation" is wrong. I have seen patients with marginal ulcers who had been told that they could eat what they wanted two weeks after operation. An ulcer does not heal in two weeks. If a surgeon thinks that a patient can have a general diet in two weeks following gastroenterostomy, he has not thought the thing out. Most surgeons are not trained in dietetics. They sometimes feel they do not need such a training, that they can get along without it. A well known surgeon is quoted as saying: "What is the use of doing a gastroenterostomy if the patient cannot eat what he wants to?" What he should say is, "What is the use of a gastroenterostomy if the patient then cannot eat what he needs?" If the ulcer patient goes back after operation to his same dietary habits, he is apt to have a recurrence of the ulcer and recurrences follow operations just as recurrences follow medical treatment, much too frequently. The postoperative care is very important.

Dr. Sanders' statement that his cases do better when they come in in an emergency suggests that the patients who have been prepared may have had the Sippy diet before operation. No fats should be given for at least 24 hours before a gastric operation. One of the things brought out by Dr. Freeman is that surgeons and gastroenterologists should work together. Practically all surgeons and gastroenterologists agree as to the indications for operation for ulcer. They practically all agree that the ulcer patient should not be operated upon without having had medical and dietary preparation by an internist, and that the postoperative dietary and medical management should be left to the physician.

OUT-PATIENT PSYCHIATRY*

By RALPH P. TRUITT, M.D.,
Baltimore, Md.

Out-patient psychiatry is of recent origin as a department of the general dispensary. Until about two decades ago the neurologic department diagnosed and treated all diseases, organic and functional, in any way related to the central nervous system. The patient material included the organic nervous diseases proper and certain other disorders questionably organic, and non-organic, in nature. Most of the latter patients were adults and their disorders long standing. Time allotted for individual studies was limited, records were brief and often written in illegible long hand and the attending private practitioner, frequently a former asylum physician, performed the complete job. Diagnosis was the principal aim and medical therapy was freely used and this consisted principally of bitter tonics, bromides, asafœtida and placebos. Drugs were occasionally alternated with electrical treatment and hypnotism, and psychotherapy was limited otherwise. In general, that was the situation one found in relation to mental disorders in a general dispensary around twenty years ago.

Psychiatric study and research in hospitals for the insane led to the establishment of the psychiatric institute, the psychopathic hospital and psychiatric clinic in the general hospital. These institutions and the work in them generally followed along the lines of the European, especially German, clinics. Modern out-patient psychiatry is an outgrowth of these earlier psychiatric institutions, with certain American modifications in personnel and activities. The advent of out-patient work in certain of these centers, and in general hospital dispensaries without beds for psychiatric patients, caused a division of the patient material formerly claimed by the neurological department. Launching of the mental hygiene movement at about the same time further emphasized the individual and community aspects of psychiatry and gave added impetus to out-patient psychiatry. The late War caused an increased recognition of psychiatry and the need of further facilities for study and treatment of psychiatric problems.

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

While there may be some quibbling here and there about who shall teach certain neuropsychiatric diseases to medical students and about what patient material belongs to neurology and what to psychiatry, there is unquestionably a general feeling that there remains a large field for further research and technic in both of these branches of medicine. That these departments can work together and complement each other as separate units in a general out-patient dispensary has been clearly demonstrated in actual practice. There seems to be no reason to question the fact that out-patient psychiatry has a place in the general dispensary and that these departments will multiply in the future as they have done in the past. Today the out-patient psychiatric department represents only one phase of activity in the field of psychiatric facilities. Habit and child guidance clinics, state hospital and mobile clinics, and the work independently carried on in schools, social agencies, courts and elsewhere are examples of other facilities.

My remarks will be limited to the organization, functions, and some of the difficulties encountered in the psychiatric department of the general hospital out-patient dispensary. Naturally these questions overlap, and in general my discussion applies only to larger cities. In the first place, the work demands the services of a psychiatrist who is interested and experienced not only in nervous and mental diseases proper, but also in the many ramifications of psychiatry and mental hygiene in the community. The insane and feeble-minded no longer constitute the bulk of out-patients. The delinquent child or adult from the court, the dependent from the social agency, the domestic squabblers from the home, the problem child, the mentally deficient child and other types of children, from the school, the home, and the agency, are among those who should be clients of a psychiatric department. These problems, in addition to physical and psychiatric study and treatment, involve questions of diagnosis and treatment which require social, intellectual, educational, vocational and other evaluations. While the psychiatrist should have a working knowledge of these factors, the social and psychological work necessitates the employment of those trained and experienced in these special fields. Whether this broader aspect of out-patient psychiatry has been thrust upon the psychiatrist or whether he has encouraged this

development, the fact remains that it is a part of his job today in the out-patient department and that it demands that he be thoroughly acquainted with the functions and problems of the schools, the social agencies, the courts and other private and public agencies if constructive work is to be accomplished in the community.

The staff for a psychiatric department should consist of psychiatrist, psychologist, psychiatric social workers and clerical assistants. The size of the staff, the full-time question, and so on, are dependent upon the size of the city, the local facilities for related work, the objectives, and the possibility of funds. The interest and funds are frequently lacking in the medical school and hospital. The organization of a department then greatly depends upon the advancement of the community in recognizing its health and welfare needs. In some cities social agencies, schools, courts, health organizations, and various club groups, have acquainted themselves with the local situation and with the possibilities of organized psychiatric work and stand ready to assist with its development. In other cities welfare federations and community chests have met the demands of an aroused community interest by partially or wholly financing the work. Philanthropic individuals and foundations should be considered as possible sources for the budget. Private and public psychiatric institutions, and city and state departments are, in some instances, sufficiently interested to help with the budget. Progressive medical schools and general hospitals are gradually recognizing the contribution which a well organized psychiatric department can make in teaching medical students, postgraduates and nurses, in ward consultation work, and in handling the out-patient psychiatric service. In return for these services they are often willing to furnish suitable quarters, equipment and supplies, and they may cooperate in financing the project. Eventually the medical school and hospital might accept complete responsibility for the department.

With such a psychiatric department it is possible to operate on a daily schedule and an opportunity is offered to sort the case material better for brief and intensive services. The latter service would be offered to those patients who present the best possible returns from treatment for the effort expended and who lend themselves to teaching and research purposes. It has already been indicated that the modern psychiatric department should be something more than a static out-patient dispensary department carrying on limited and superficial diagnostic and treatment work with large groups of patients. It should be an important force for mental health in the community which it serves. Through close cooperation and loose affiliations with the various community agencies and groups of individuals, it should be able to develop an intelligent awareness of the community's mental health problems, their prevention, early recognition and proper care and treatment. Educational work, directed especially to those community organizations dealing with children and large groups of people, and to the general public, should be a major issue in the department's activities.

A complete social history is absolutely necessary if the mentally disordered and others with behavior problems are to be intelligently and intensively studied and treated. Frequently it is in the home and in the other social relationships of the individual that his difficulties are found. The home, school and work situations cannot be brought to the department, and social treatment likewise may call for extra-mural activities by the psychiatric social worker. Intelligence, educational, and vocational abilities and disabilities must be analyzed by the psychologist and treatment outlined in this field. With the social, physical, intellectual and other factors at hand, the psychiatrist attempts to correlate these findings in relation to the individual's attitudes, behavior or reactions and in relation to the social group where he must function. Case records should clearly present a picture of the total individual, his assets and his liabilities, the plan for his treatment and its progress. As a result of thorough individualized study, treatment is possible on a more secure basis. What has gone before in the individual's experience? What is his physical and mental equipment? What is his training in the use of the equipment which he has? These are important issues in understanding his behavior and in attempting his adjustment. When these studies are completed the interested and responsible community agent confers with the department staff, when the various findings are surveyed and a treatment plan outlined. Written reports are sent to those responsible for the patient and from time to time treatment conferences are held, when new develop-

ments are discussed and further treatment plans laid.

The study of an individual patient often involves his entire family and various phases of his community relationships. Diagnosis is usually made in regard to cause and effect relationships, and it is expressed in understandable working terms. Diagnostic classification schemes present difficulties in an out-patient department. Treatment may involve a variety of questions regarding the patient and in his environment. One attempts to modify that which can be modified so that the individual can function better. Assets and abilities are helpful in working out a plan for him and his liabilities are strengthened whenever possible. Domestic and economic questions may be important and may be worked out. Intelligence, personality, and habit patterns may present obstacles in treatment. Compromises and evasions, compensations and failures, conflicts and resistances, may be difficult to handle. The general health situation and hygienic habits may be improved, social and recreational interests may be developed, family and employers may be taught better methods of dealing with the patient, and the patient may learn more mature ways of meeting life's situations and a more healthy attitude in facing reality.

The "conspiracy of causes," the possible combination of symptoms and the variety of possible reactions in behavior problems, whether of children or adults, definitely indicate that one cannot get at the base of the situation and help the individual patient without spending considerable time and energy in study and analyzing the patient and his total environment. This causes psychiatric work to be expensive, but with a modern psychiatric department functioning as a preventive and educational agency in the community, and as a medical teaching center, the number of patients studied and adjusted should not be the sole basis for estimating its cost. The general nature of most out-patient material emphasizes the fact that prevention and earlier recognition is necessary to reduce the great expense of handling many end-result disorders of behavior. To strike at the roots of this problem, the psychiatric department must become closely identified with the community life and its agencies. At least a mental hygiene point of view should be a part of the personal and working equipment of parents, school teachers, social workers, nurses and others, if reasonable success is expected in preventive mental medicine comparable to that already attained in certain phases of physical health work.

Psychoneurotic and other functional types of disorders are repeatedly admitted to the psychiatric department after they have passed through the hands of a number of private practitioners and after they have made the rounds of the various out-patient medical and surgical departments. The dispensary records and the histories of these individuals frequently reveal many diagnoses, considerable treatment, and the various laboratory technics. As a rule the studies and treatment are directed to the various organ systems and rarely does one find any reference to the individual who owns these organs, the living and functioning organism as a whole, who thinks and feels. Possibly this state of affairs explains a rather prevalent expression heard about psychiatric work, that "you cannot do much with these cases." A surgeon may successfully cure the infected toe, or he may amputate the toe, or perhaps the leg, depending on the condition of the extremity. In any case the operation is usually successful. An artificial limb is usually unsatisfactory, but it helps one to move about. The surgeon, however, has not replaced the original extremity. So it is in psychiatric practice when patients come to one after the disease process has been going on for months and years. Perhaps the difficulties in the situation are inherent in the average medical school curriculum which does not provide adequate modern psychiatric teaching and which does provide for the teaching of a professional technic which calls for a process of elimination through serial examination, diagnosis and treatment. It is little wonder that the average senior medical student finds the psychoneurotic and other functional mental disorders baffling problems after the various organ systems studied fail to reveal sufficient pathology to account for the symptoms. Apparently this experience is sometimes continued in hospital and private practice.

A brief investigation by the physician of the patient's social relationships and the difficulties he has encountered in meeting and adjusting to the more important and complex situations in life would frequently throw considerable light on the patient's symptoms. A few

instances, briefly mentioned, will help to illustrate this point.

A six-year-old problem child was studied by a physician during one of the child's behavior episodes, when a diagnosis of feeble-mindedness was made and treatment in a feeble-minded colony recommended. It was found that the child's father had been dead for five years and that the mother daily worked away from home. This only child and grandchild was the sole outlet for the mother's disappointed emotional life and also the plaything for the aged grandparents with whom the mother and the child lived. The child was badly spoiled, its entire behavior was at an infantile level, and the resulting temper episodes overshadowed the child's intelligence, which caused the mistaken diagnosis and recommendations. Treatment of the mother's emotional condition and a suitable boarding home for mother and child were among other recommendations made. The child's personality and behavior should early mature to the average intellectual level with which the psychologist found the child endowed.

After the family physician and a cardiac specialist had failed to account for the "heart attacks" of a nine-year-old boy, it was learned that the child slept in the bedroom of his parents. The attacks occurred at night and coincided with the parents' retiring and their display of affection. The boy gained by his attacks a place in his alarmed mother's bed and at the same time he frustrated his father's attention to his mother.

Compulsion neurosis on a constitutional basis was the diagnosis in the case of a twelve-year-old lad and an unfavorable prognosis was predicted. Shortly after he was removed from the irritating factors in his home situation and his physical health improved, his motor habit formations have gradually decreased and show signs of eventually disappearing.

A rather dull seventeen-year-old girl did not display her hysterical seizures until after the surgeon had removed her appendix. The abdominal distress which she complained of before the operation was increased following the surgical procedure. She had been given no sex education, was most religious, had begun to menstruate and was quite disturbed by a guilt reaction associated with her sex development and feelings.

A fear of germs was the complaint of a twenty-five-year-old married woman with three children. At the time of her examination she was living with her parents. The phobia had not been relieved after repeated physical examinations and reassurance on the part of both her physician and her family. Her husband had had an active pulmonary tuberculosis, but had been free from the disease for some time. When one discussed her situation with her it was revealed that she was most unhappily married. Her parents had arranged her marriage for her when she was sixteen years of age. The husband was well-to-do and several years her senior. He was a settled home man in his habits, while she was anxious for outside interests. He was apparently reasonable in his sex demands, while she was disgusted with sex relations. She frankly admitted that she had never loved her husband and that she was anxious to leave him. She was unable to take a positive stand in the matter, but the fear came to her rescue and offered a plausible means of escape from her intolerable situation.

A husky laborer of forty-two years had been treated for one year for "stomach trouble." He was certain that he had cancer of the stomach and that the medicines which he had taken were of no benefit to him. He told a rather pathetic story about his father's death, when the patient was thirteen years of age, and how he had to go to work to help support his mother. His three older sisters married early and left home and he committed himself to the task of supporting and remaining with his mother. For one year previous to his own illness he had quit work and nursed his mother until her death occurred from cancer of the stomach. It was then that his symptoms became identified with those of the mother.

A tense and anxious woman of 47 years, whose complaints centered about her abdomen, had had several diagnoses and various kinds of therapy. In a brief interview with this patient it was revealed that her mother had died when she was young and that her father had been a minister. She was the youngest child and the father's favorite. She afterwards kept house for the father. At 19 years she was in love and wanted to marry, but the father objected. Following her father's death, six years later, she married a man 18 years older than herself. She remarked that her husband "seems more like an uncle or father." They have had no children, she thinks, because she has had no "nature." Sex relations have always been distasteful to her, but she has "tried to be a good Christian." Menopause occurred at 38 years and this was followed by certain nervous symptoms and later "nervous attacks" associated with unconsciousness. These attacks usually occur over a three or four day period and usually at night. She has an active dream life and many of these dreams are about her first lover, when her "nature" returns. She actually sees this man occasionally and they converse together. Recently, however, she told him that it was best that they not be together and she explained this by saying that she was married and living a religious life, and that she was afraid "old times might return."

The psychiatric department is the only dispensary department where an attempt is made to study the individual patient as a whole. Since the department is located near the other departments of the dispensary and receives patient material from these departments, an unusual opportunity is afforded for educational contacts which should go far in helping nurses and students and those physicians in the general medical and special fields to become psychiatrically minded.

To summarize briefly, one might say that the organization of a modern psychiatric department in a general dispensary should depend upon the recognized need within this unit. Since this need may be slow in being recognized, it may be necessary to ask the aid of certain community forces in developing such a department. This aid is usually possible in

the larger cities and may need only to be aroused by a group of interested and informed people. The nature of modern psychiatric department practice demands personnel experienced in social work, psychology and psychiatry. The functions of a psychiatric department are diagnostic, using that term in its broadest sense; therapeutic, in the community as a rule, giving early hospital and other institutional care when advisable; educational, carried on with the community organizations, nurses, medical students and the medical profession; cooperative, with city and state officials, departments and institutions; and investigative, directed toward the causes and treatment of behavior disorders in general.

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DISCUSSION (*Abstract*)

Dr. Frank J. O'Brien, Louisville, Ky.—The understanding of psychiatry has been for many years confined to and identified with such terms as "crazy," "insane," "idiot," and "psychopathic," and the average dispensary man has not been informed about the newer interests of psychiatry, namely: those mental problems that are more or less common to the average person as well as those peculiar to the physically ill. Naturally, it was not until psychiatry, with these newer interests and newer knowledge, was able to penetrate into the field to prevent, that it has been in a position to offer dispensary service this broader assistance.

One of the more important facts stressed by the essayist was the broad conception of what psychiatry really embraces. As we know, it is concerned not only with the more frank mental conditions found in the adult suffering with a psychosis, with seizures or convulsions, with neurasthenic and psychasthenic conditions and the like, but also with the behavior and personality deviations of the child.

I think another point mentioned by the essayist also warrants emphasis, namely: that from the very nature of psychiatric problems, not only is the cause frequently obscure, but even signs and symptoms often lack clarity. The process of coming to an accurate diagnosis frequently takes considerable time and study. A more complex administration and professional set-up are necessary in the psychiatric dispensary than in other dispensaries.

A very practical, but rather embarrassing, point at times is the question of the cost for psychiatric service. Naturally there is a tendency to compare the cost of one dispensary service with that of another. It frequently happens that comparisons are made in terms of the number of individuals who pass through a psychiatric clinic as compared with the number who pass through a general, surgical or medical clinic. Just why the psychiatric clinic can handle only a limited number of patients in a given time as compared to those handled by other clinics is evident to those acquainted with the nature of a psychiatric investigation.

The psychiatrist must learn to treat the individual who has the disease rather than the disease. It is necessary to acquire insight into the role that the mind plays, not only in disease, but in health.

The responsibility of the psychiatrist as a medically trained individual to the general community cannot be overestimated. We are beginning to recognize more and more the influences and forces which seem to have no medical value and, yet, which are both direct and indirect elements in the formation of health and sickness. The improper placement of a child in school, disturbances caused by free play that is not supervised, and conduct labeled "running away," "stealing," or "truancy" are recognized today as situations that should be of concern to the physician.

Universities throughout the country are recognizing more and more the need of providing psychiatric service to the student body. This certainly is a new and fertile field for service.

Dr. W. W. Young, Atlanta, Ga.—The Dean of our medical school, returning from a meeting of the Association of American Medical Colleges, at a faculty meeting recently stated that at this meeting it was the consensus of opinion that the medical schools of this country would be forced to recognize psychiatry as a major subject.

In our particular community we have to overcome the inertia not of the laymen nor of the community as a whole, but of the medical profession. It is a question of combating old ideas and old resistances in the medical profession. It is up to all of us to promote education in this particular field.

Dr. David C. Wilson, University, Va.—The situation of the Psychiatric Department of the University of Virginia Medical School is rather unusual. The Medical School is situated in a small town of twenty thousand and the attempt to start a Mental Hygiene Clinic, therefore, has been very difficult. There were no community organizations which would help in its support, and no one educated to appreciate its value. Yet there were many problems needing attention.

As we could not employ social workers or a full-time psychologist, an effort was made to secure assistance from the Departments of Psychology and Sociology of the University. These two Departments have cooperated with the Clinic, supplied a psychologist, and have done something along the line of social work. It is rather interesting to note, however, that the outlook of the psychologist is absolutely different from that of the psychiatrist. His attitude is more theoretical and more detached. This is also true of the Sociological Department, which is interested in general and large problems rather than the small de-

tailed work of the social service worker. It has been rather hard to get the Sociological Department to cooperate. However, in their stead we have been able to use the Children's Home Society. It has some very good social workers, of course, not psychiatrically trained, but still very efficient in this work. They have filled in the needs for social work and have been a great help in the Clinic, while we in turn have been able to help them. By combining these different departments that are interested in this type of work we have been able to make a go. Just how long the Clinic will be run under these circumstances is hard to say at this time. It certainly solves the financial problems as the undergraduate and graduate students of these departments can be used in the Clinic.

Dr. Daniel D. V. Stuart, Jr., Washington, D. C.—The need of training students in neurology and psychiatry and of training the general practitioner in the neuropsychiatric viewpoint have been brought out. We must keep sight of another point: there are too few of us who are organic workers who are also competent psychiatrists, and also too few of us who are psychiatrists who have an organic knowledge of neurology. The line of cleavage between neurology and psychiatry is disappearing, and unless we are neuropsychiatrists we are going to be disappointing to the members of the community who call upon us.

Dr. Walter J. Otis, New Orleans, La.—After we have helped the patient to an almost complete social adjustment does our vigilance rest there? How frequently are these cases followed up? Can we be assured that the environment we are returning these individuals to is not another incubating atmosphere for a recurrence? How far and to what extent are mental hygiene procedures used in the follow-up of these cases?

Another important factor entering the picture is the personnel of these departments; for each neuropsychiatrist is aware of the fact that every social worker is not social-minded enough to be an intelligent psychiatric social worker in the strict sense of the word. There is an injection of his own personality into his duties. This may react on the patient with resultant antagonism, rather than cooperation and a complete liaison between them.

Dr. Truitt (closing).—The question of cost of an out-patient psychiatric department depends on what is wanted and what is available in personnel and funds. If there is real interest in developing a department and if there are latent fields of related work available, there is no reason why the matter cannot be worked out without a great deal of cost. Dr. Wilson has apparently been able to develop a serviceable department in a small community by taking advantage of the local facilities. The university departments of sociology, pedagogy and psychology are frequently far more interested in this work than is the department of medicine. Medical schools will have to start teaching modern psychiatry, sooner or later, or they will have to say that this work does not belong to the medical field. The average psychiatric social worker today knows as much, or more, about mental hygiene as the average medical student knows after he has completed his neuropsychiatric studies. Personally I feel that the work should be medically controlled, but there is a more rapidly growing interest in other fields.

The question of a full-time psychiatrist is another debatable question and again this question is greatly dependent upon the demands and needs in the local situation and the funds available. In smaller communities possibly a part-time psychiatrist may serve the demand in the beginning. If there is a well organized social agency group with trained workers, if there is a socially minded judge in the juvenile court who has a fairly intelligent probation staff, if there is a progressive school system with teachers aware of some of their problems, and if the medical men in attendance at the other out-patient departments are interested, undoubtedly a full-time psychiatrist can be kept busy. This is especially true if he undertakes teaching in the medical school and if he does the necessary educational job with nurses, social workers, teachers, and others in other departments and in the community. In the larger cities where there exists an awareness of the mental hygiene or psychiatric problems of children and adults, it is not a question of a part-time psychiatrist but of how many full-time psychiatrists are necessary. Some time ago one of the children's social agencies in Baltimore asked the Community Fund for $3,000 for a part-time consulting psychiatrist on its staff. Another children's agency in the city has had the services of a part-time psychiatrist for several years. I believe a better job can be done by pooling these resources and activities in a centralized full-time personnel plan. Both the cost of a department and the personnel question center largely about the question of the community agencies' awareness of their needs in this direction.

There is a great dearth of psychiatric personnel for the work. This largely goes back to medical teaching of psychiatry and the attitude of the general medical profession toward psychiatry. Pediatricians are interested because a large part of their work is in relation to the mental hygiene of children. The medical faculty of today is one that was medically trained when the teaching of psychiatry was largely in its infancy and in the hands of neurologists. Until the medical teacher's attitude is more favorable toward the teaching of modern psychiatry, the attitude and interest of medical students will not be favorable toward the psychiatric field. I recall during my medical student days a so-called "paranoiac," "King Philip" by name, who was the teaching subject, I learned later, for several medical schools of the city for a number of years. No longer does one teach "text book" psychiatry by side-show methods. Most of the present clinical psychiatrists are trained in the fundamentals of psychiatry after graduation and their interest in the field is not generally aroused during their student days. The dearth of social workers is not so great and psychologists are generally available for clinical work.

You will always find social workers and others who deal with individuals in the community interested in the department because it brings to their work an understanding of their clients which they ordinarily are denied and their work is therefore made easier by the department's assistance. Without this assistance workers often struggle blindly with their clients. In our out-patient psychiatric department in Baltimore we receive patients unknown to any agency who come directly to the department for help and those who are directed to the department by agencies doing no

case work. Patients from other out-patient departments are accepted in this service group. The department is responsible for the complete study, treatment and follow-up of these patients. Another group of patients come to the department from case working agencies and in this situation the agency worker is responsible for the patient and she furnishes the department with the patient's history, then the patient is studied and in conference with the worker a plan is mapped out for his treatment. The worker, however, is not separated from her patient and she is responsible for his reporting to the department for treatment and for all treatment carried on outside of the department. Any time after the initial study and treatment plan is started the worker, or the department, may request a treatment conference. Some of the agency workers send progress or treatment reports to the department between conferences. There is also an occasional status census of all the department case material and in this way the work with patients is kept fairly active.

PERIOD OF DISABILITY FOLLOWING FRACTURES OF THE LONG BONES*

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The more I read of fractures, and the more contact I have with them in the treating of them and in passing opinion on their results in compensation cases, the more it is borne in upon me that we of the profession are becoming like the man who could not see the forest for the trees. Our attention in the literature is so taken up with the fracture *per se* and the various methods of advanced treatment of it, that we fail to grasp the fundamentals of the condition as a whole. The greatest question of all is getting the patient back to the duties of his vocation. From the inception of his disability until the time he can return to usefulness in his life's work, our constant attention should be directed towards this end. This period is not only one of financial loss to him and to the compensation carriers, if there are any, but the morale of the man as a whole suffers and often his attitude toward life in general. When we consider that the average industrial plant or any other agency with large experience has never, so far as I can ascertain, kept statistical data as to just how much time is lost in each case and how it may be lessened, it is not surprising that it is hard to get any basic figures to form an opinion on this line of work.

Some several years ago I wrote the chief surgeons of several railroads asking if they could give me the average periods of disability for:

(1) Fractures of the femur
(2) Fractures of the leg
(3) Fractures of the forearm, both bones
(4) Colles' fractures
(5) Fractures of the humerus

None of them could even approximate a satisfactory answer. I then had the Relief Department of the Baltimore and Ohio Railroad dig out all the figures that could be gotten on this subject and the answer ran about as follows:

Femur, 8 months
Leg, 6 months
Both bones of forearm, 4 months
Colles' fracture, 3 months
Humerus, 100 days

Think of the tremendous loss to the patient, and through him to society as a whole, when the aggregate is considered; and I know that these figures are not high enough in many cases. Some years ago Estes of South Bethlehem, Pennsylvania, estimated the average for the femur at thirteen months. In good hands we get bony union, as shown by the x-ray, in about two months.

If it takes two months for the solid union of the femur, what is the cause of the six months of disability that ensues before the patient returns to his usual occupation? The answer to me seems to be evident: we are paying so much attention to the broken bone that we lose sight of the most disabling part of the injury, namely, that to the soft parts. And from the experience of thirty years in this work I am sure a large part of this disability may be avoided by avoiding prolonged fixation and practising early removal of splints, early massage and early physiological active use of the extremity involved. The more fractures I treat the more I am convinced that physiological use is our greatest ally in procuring the desired end. In the literature we learn, or are told, that a fractured femur should be put in fixation for eight weeks. From my personal experience, in the average case three weeks is enough, and for twenty years I have removed fixation in these cases at the end of three weeks. If for any reason it is found that we have not gotten good soft union the fixation can be replaced in a modified form, but the longer the limb is fixed the greater the atrophy not only of muscles, but of bones as well. Along with the atrophy of the muscles goes

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*Read in Section on Railway Surgery, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

†Dr. Claybrook died on February 28, 1931.

fibrosis and hardening that eventually must be overcome. If this hardening is overcome before it has gotten too firm, we can get the patient up sooner and back to his work. All of us have removed fixation from the femur and found that the knee was stiff and could not be flexed. As a matter of fact, there is no trouble with the joint, but the quadriceps muscles have become fibrosed and hardened and the fibers adhere to one another and to the bone as a whole in the region of the break. If we permit this condition to go on for eight weeks, we must undo it, and when it has been of long standing it takes a great deal of undoing. Exactly the same thing occurs in the leg, arm and forearm, but to a less extent because of the lessened volume of muscle involved.

I have heard so eminent an author as Arthur Dean Bevan refer to "plaster of paris disease of bone." As a matter of fact, it is atrophy of bone which occurs. This is not manifested by lessened volume as in muscle, because the bone is rigid and not collapsible. The bony substance thins out and wastes from lack of the solid matter which is absorbed during the atrophy so that we get much less of a shadow with the x-rays than in the normal bone. It is not plaster of paris disease, but is more marked in plaster fixation, because plaster gives the most rigid and complete fixation. This porosity and lessening of bony substance is scarcely a desirable condition to bring about in a bone that we are trying to restore to normal, and prolonged fixation is a tremendous factor in producing the condition. The most important point to get early restoration of function is, first, early and firm fixation in a position of stability, then early removal of fixation, followed by heat and massage for a week, and then the beginning of active motion. At four to five weeks the patient is gotten on crutches and the extremity allowed to swing.

I have felt that large employers of laborers would gain a great deal if they would install a system of statistics of major fractures so that accurate figures might be obtained as to the periods of disability following different methods of treatment. If so, then an outline of a generalized standard method could be considered. Of course, we have to bear in mind that no two fractures are alike and that the surrounding circumstances are never the same. There should be some arrangement whereby the injured could be allowed to return to light work much earlier than it is possible for him to return to his regular occupation. He would thus be able to avail himself of the benefits of physiological use. Prolonged disability has a poor effect on the general condition and morale of the injured, and hope deferred in the matter of returning to a gainful occupation is disastrous to his well being. From this condition many eventually drift into that of chronic complainers, for which they cannot well be blamed.

About two years ago President Willard, of the Baltimore and Ohio Railroad, gave a free hand to see what, if anything, could be done along this line. I was invited to address a meeting of the lodge of the shop crafts and made the following suggestions at that meeting:

That at each terminal a committee of rehabilitation be appointed, this committee to be composed of three men, one from the operating department, one from the relief department, and one from the lodges; that this committee maintain a list of jobs at lighter work that might be available for subnormal men who had been injured. When the surgeon certified that a man had reached a stage in his convalescence where light work would be beneficial, the committee was to assign him to a suitable job, and as soon as he was sufficiently restored to resume his regular job he would be certified for it. It was also stipulated that no man could remain on such a job for more than ninety days without the unanimous agreement of the committee, and further, when a man was placed in a position where the pay was at a reduced rate, that he should draw his relief, or such part of it as would bring his pay up to the normal pay of his regular job.

If such an arrangement could be installed it would be of tremendous benefit to the disabled employe and a great advantage in getting him fit and able to return to his work. For instance, the brakeman having broken a leg can well return to useful and beneficial employment from four to six weeks earlier than he can resume active train service.

Organized labor itself and the seniority rules are the great bars to getting such a plan into force. The lodges are suspicious that an effort is being made to get them off of compensation, and the men themselves seem to fear that some subnormal man will be put in a position that may be a detriment to him. I believe, however, that if careful thought is given to the matter by leaders on both sides, the problem can be solved to the benefit of all. By leaders I do not necessarily mean men high up in the conclaves, but men with a large outlook on the problems of life and a fair attitude towards both workers and employers.

DISCUSSION (*Abstract*)

Dr. Robert Carothers, Cincinnati, Ohio.—If a man with Ringling's circus can stand on the bare back of a

horse and do a sort of a half way act with an ankle fracture in four weeks, why cannot other men get back to some kind of work earlier?

I see no reason why a man with fracture of the femur cannot get back to work in four or six months. The average railroad man is not old, and during the treatment he can be active. We have had him in bed turning somersaults, and kept him active. He is kept in bed for four weeks, and then we put a gelatin cast on him, still on the frame, and pull with the gelatin cast for four more weeks. In four weeks more he is doing his own physiotherapy, and at the end of the twelfth week he is up and going and within eight weeks more he is back on the job. Why cannot the average case be treated that way? The patient may develop fibrosis when he gets up and that swelling of the parts which twenty-five or thirty years ago was believed to help the process of repair. It does not. He gets the fibrosis from the swelling.

Dr. Claybrook (closing).—I will cite one patient because he was a man who did what I told him he could do. He was a farmer who weighed 265 pounds. One of Henry Ford's steel mules ran over him. He had a compound fracture above the ankle and fractured both bones of the right forearm. After 11 days I told him to have the nurse let him walk holding to her shoulder. He walked up and down the hall, and in two weeks he left the hospital and went to a hotel. In three weeks I stopped at the hotel and took the cast off, gave him a little fixation, applied adhesive plaster and told him to get up and get around. In four weeks from the day he was put in the hospital he walked from the hotel four blocks to my office. On March 16 he was hurt and on May 16 he got his saddle on that steel mule and went back to work. He did this with benefit to himself rather than with injury to himself.

THE USE OF OBSTETRICAL FORCEPS*

By F. M. T. TANKERSLEY, A.B., M.D.,†
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The art of midwifery is an ancient one, and it is surprising that some form of mechanical aid was not devised to alleviate the sufferings of womanhood before the forceps were invented. Perhaps the reason was the fact that in ancient times man was not allowed in the delivery room, and when it became necessary for him to be there, his appearance usually meant death to the woman in labor. Crude forceps were in use in earlier times. The Arabians, Albucasis and Avicenna, about the Tenth or Eleventh Century, wrote of forceps, but the forceps that they used had teeth on the inner surface for grasping the head. Many other types of crude forceps are described in the literature, for examples, those used by Rueff, Peirre Franco, and Jean Palfyn. The forceps which are used today, of course with improvements, were first invented by a member of the Chamberlen family. The secret of its use was guarded through four generations of that family. Finally it was sold to a Dutchman for $25,000, and some said that only one blade was sold, even at that figure!

The best method for testing forceps was that advocated by Dr. Ellerslie Wallace, of the Jefferson Medical College, namely: lock the forceps and measure accurately the space at the end of the blades. Then stand, holding the forceps at arm's length, allow them to fall, ends first, striking the floor, remeasure the space at the end of the blades. If the measurements do not check, do not purchase the forceps. If the measurements are the same, you may rest assured that the steel in the forceps is reliable.

The purpose of the forceps is to facilitate the delivery of the child. The main indication for the use of forceps is anything that endangers either the life of the mother or the child, of course considering the advisability of the application of the forceps. In my opinion, forceps should never be applied until the head has passed completely through the cervix. In other words, high forceps should never be used, because of the danger of extensive tears of the cervix extending sometimes into the body of the uterus. These lacerations cannot easily be repaired and are easily infected. Such conditions result at times in the invalidism of the mother. There is a dange of excessive hemorrhage, which is not easily controlled, and has the chance of terminating fatally. Then there is the element of danger to the child, of mutilation, of cerebral hemorrhage, the possibility of an injury to its brain. The bravery, the dauntless courage shown by woman on the battle field of the lying-in room, should reward her efforts with something other than an idiot to remind her of her sacrifice and ordeal. Should the pelvis be too contracted, or should the position of the head be such that it will not come through the cervix, either the cesarean section or version, as your better judgment tells you, are the operations of choice. Never resort to high forceps.

In taking the position that high forceps should never be used, I am aware of the fact that the procedure is advocated in all recog-

*Received for publication August 6, 1931.
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nized text books. Those who write books are prone to follow in the footsteps of those who have written before them. Velpeau, the Frenchman, made a slip in one of his writings, which was that the sacrum was concave posteriorly and convex anteriorly. In most of the books written in France for the next twenty years the same error occurred. Dr. Irving Potter, of Buffalo, New York, has awakened the obstetricians to the possibilities of the version, showing a low maternal and fetal mortality rate. Dr. Whittridge Williams has a cesarean section maternal mortality rate of 2 per cent for women whose membrane had not ruptured and who had not been examined vaginally; a material mortality rate of 10 per cent in those whose membranes had ruptured and who were in the second stage of labor. As either of these two maneuvers offers a solution other than with high forceps for the termination of labor, I wish to reiterate the statement that in no case is one justified in the use of high forceps.

Practically speaking, mid-forceps is the application of forceps after the head has passed through the cervix, and before it rests on the floor of the perineum. Low forceps is the application of forceps after the head rests on the floor of the perineum.

For practical purposes we shall take the use of the forceps in occipito-anterior and posterior positions, for both primipara and multipara, in the hospital specially prepared for obstetrical cases, and the indications for its use in the home. By the term, in the home, I mean the usual home that one might be called to, without the service of trained assistants and without the advantage of aseptic preparation.

Occipito-anterior Positions in the Home, in Either Multipara or Primipara.—Under these conditions it is best not to apply forceps, but to try for a normal delivery without the use of instruments. Necessity forces us to work here under conditions that are not sterile. There is no one to give a good anesthetic. Usually some member of the family has to be asked to do this. There is no one to aid in holding the knees of the patient apart or to hold the feet on the edge of the bed or table as the case may be. Then there is always that downward hump in the bed where the patient's buttocks rests. The famous obstetricians who write the books do not have such conditions to deal with.

Occipito-anterior Positions in the Hospital in the Primipara.—It is best to wait until one notices the perineum beginning to bulge with each pain before the use of forceps. Dr. Hilliard Miller, of New Orleans, delivers all primipara with the use of forceps and an extensive lateral episiotomy. He states that he saves the mother some of the hard pains of the second stage of labor, and the perineum from the excessive amount of stretching it would have to undergo for the delivery of the head. Consequently there is no aftermath of cystoceles and rectoceles to any marked degree; he has never repaired an episiotomy without getting primary union, and is never troubled by infection. I worked with Dr. Miller as an intern at the Touro Infirmary, and I can verify his statements. A clean, thin scar is his reward. In my own work I do not go so far as he does. In all primipara in the hospitals after the head has passed through the cervix and with the perineum beginning to bulge slightly with each pain, the patient is anesthetized. The perineum is gradually dilated by massage with the hand, using a lubricant. Forceps are applied. Gradual traction is made with a small amount of muscular effort, occasional rests and unlocking of the blades. This is kept up until I can catch the chin of the child by deep pressure back of the rectum with the finger tips of my free hand. The head now rests upon the outstretched thumb. The forceps are unlocked, and gently removed. By gradually pealing back the perineum with a sponge, particularly at the upper angles, and by gradual pressure upon the abdomen of the mother by a trained assistant, the head is delivered easily, usually without laceration of the perineum. This is the method of delivery of the head that I use in all forceps cases. Always I have scissors near by, so that if the perineum shows the least signs of tearing, the lateral episiotomy is resorted to, as suggested by Dr. Miller. This procedure, of course, prevents any possibility of third degree laceration.

When complications exist either in the hospital or in the home on the part of the mother such as acute infectious diseases, heart disease, tuberculosis, severe nephritis, pre-eclampsia, eclampsia, premature separation of the placenta or exhaustion; on the part of the child a prolapse of the cord which is still pulsating, or if the fetal heart sounds are above 160 or below 100, or when meconium begins to pass,

I terminate labor every time. I resort either to mid-forceps or low-forceps, as necessity requires, even though one be in the home without professional aid, and one has to conscript the husband, the mother, aunts or visitors for active service.

In the hospital the occipito-anterior in the multipara is best delivered without the aid of instruments, provided the progress of labor is steady and there is no particular indication for the forceps.

Persistent Occipito-posterior Position, Either in the Primipara or Multipara, in the Home or in the Hospital.—Volumes have been written as to the way to care for this most difficult situation. The more one reads about it, the more confused one becomes, as for instance by the double application of the forceps recommended by Scanzoni. One becomes almost a contortionist both mentally and physically in attempting this maneuver. The simplest, easiest and most practical way to deliver an occipito-posterior is manually to rotate the head to an anterior position. If this maneuver fails, resort to the use of forceps and deliver as an occipito-posterior, making use of an extensive lateral episiotomy. In hospital cases where the cervix is completely dilated, or can be completely dilated readily, and where the head is high and floating, it is best to resort to version to terminate labor. If the pelvis is too contracted or if hydrocephalus exists, cesarean section is indicated.

When the head rests on the floor of a rigid perineum, or where large cystoceles or rectoceles exist, and if much effort is expected on the part of the mother to complete the delivery, it is best to anesthetize and apply low-forceps, regardless of whether one be in the hospital or in the home. In my opinion there is no need of waiting one or two hours and allowing the mother to wear herself out both mentally and physically, when this condition can be remedied easily and practically without danger either to the mother or child.

I heard a lecture when I was an assistant house surgeon at the New York Lying-In Hospital that I will never forget. Dr. Asa B. Davis told us that brute strength was never to be used in forceps deliveries. He stated that in his earlier days he thought that an obstetrician should be a powerful man, but as his judgment had been ripened by age, he had changed his opinion and felt that one should be physically delicate, so that force and brute strength could not be used in forceps deliveries. He taught us that one should not work hastily, except in emergencies; that periods of rest should be taken during a delivery, occasionally unlocking the blades of the forceps. He taught us that one should work carefully, cautiously and conservatively.

The best treatment for these cases in which cephalhematoma appears after the use of forceps is to aspirate the bloody fluid with a large needle, then apply a sterile sea sponge over this area and bind snugly. The sponge should be kept moist with sterile saline, so that the pressure will be continuous. A recent book concerning cranial injuries of the newborn by Dr. Ehrenfest recommends only a tight bandage in cases of cephalhematoma. The method described above not only gives excellent results in the treatment of cephalhematoma in the new-born, but also with adults that have this condition following head injuries. The credit for this mode of treatment goes to Dr. L. L. Hill, of Montgomery, Alabama.

CONCLUSIONS

(1) Never use high forceps! Cesarean section or version, as conditions indicate, are safer procedures.

(2) Forceps may be applied with safety in all primipara in the hospital after the perineum begins to bulge.

(3) Always resort to the lateral episiotomy in all cases where a tear is expected, as this prevents third degree lacerations.

(4) Use forceps on multipara only when the progress of labor is slow or when there are special indications for their use.

(5) In all persistent occipito-posterior positions attempt manual rotation. If this fails, deliver as an occipito-posterior position with the use of forceps, resort to the aid of an extensive lateral episiotomy. If the head is high and floating with the cervix completely dilated or easily dilated, employ version in the hospital. If the pelvis is too contracted for delivery below, employ the cesarean.

(6) Use forceps on all cases that will save the mother a marked amount of physical and mental strain.

(7) Do not use brute strength in forceps deliveries, but work carefully, cautiously and conservatively.

"Be not the first by whom the new is tried,
Nor yet the last to lay the old aside."—*Pope.*

THE EFFECT OF BACTERIOPHAGE IN EXPERIMENTAL STAPHYLOCOCCUS AND STREPTOCOCCUS SKIN INFECTIONS*

By JOHN E. WALKER, M.D.,
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A number of clinical reports, among which may be mentioned those of Compton,[1] of Larkum,[2] and of Hauduroy,[3] seem to indicate fairly clearly that bacteriophage is of service in the local or general treatment of infectious diseases. However, as is so often the case in purely clinical observations it was difficult for these authors to support their conclusions by comparison of the treated cases with a series of adequate controls not treated. There is evidently need for thorough investigations of the therapeutic effect of bacteriophage in experimental animal infections. It is true that D'Herelle[4] has noted striking results from the use of bacteriophage in epizootic diseases of animals. Bronfenbrenner,[5] however, does not apparently accept D'Herelle's conclusions, for he states that animal experiments tending to show the therapeutic efficacy of bacteriophage have not been adequately controlled.

The observations to be reported in this paper are based upon the fact that the intracutaneous injection of staphylococci into the shaven skin of rabbits results in the formation of a localized abscess. Twenty-four hours after injection there is an area of erythema, which gradually proceeds to suppuration. The lesion reaches its height at about the seventh day. The exudate then begins to be absorbed, or else is discharged through a rupture in the epithelium. It was a simple matter to inject bacteriophage into such areas, or to inject bacteriophage intravenously, subsequent to the injection of staphylococci and to observe whether the bacteriophage had any effect on the evolution of the lesion as compared to control lesions not so treated.

The staphylococcus bacteriophage used in the experiments was the filtrate of a recently lysed broth culture of the staphylococcus. It was of such strength that 0.000,000,01 c. c. caused the lysis of a young broth culture of the organism. The staphylococcus was a strain recently isolated from a furuncle. The bacteriophage was polyvalent in the sense that it caused the lysis of 75 out of 80 different strains of staphylococci against which it was tested. The number of staphylococci injected intracutaneously was kept constant at 0.5 c. c. of a 24 hour broth culture. The volume of bacteriophage was also 0.5 c. c., either full strength or diluted as indicated below. From 4 to 8 injections were usually made in each animal. The control lesion was always in the same animal as the lesions treated with bacteriophage, except with lesions treated by intravenous injection of bacteriophage, in which case the control lesions had of necessity to be placed in another animal.

The major results of the investigation were entirely negative, and may be summarized very briefly. There was no effect of bacteriophage on the lesion when bacteriophage was injected into a site previously injected with susceptible staphylococci. Even when full strength bacteriophage was injected through the same needle left *in situ* which had been used two minutes previously for the injection of the organisms, there was no visible effect on the lesion subsequently developing as compared to a control lesion not so treated. Bacteriophage injected into fully developed lesions also failed to have any effect on the evolution of the lesions. Altogether, 40 experiments, using 15 animals, were performed in this investigation of the local effects of bacteriophage on the lesions, with uniformly negative results.

Likewise, the intravenous injection of bacteriophage subsequent to the intracutaneous injection of staphylococci had no observable effect on the lesions. Five c. c. of bacteriophage was theoretically capable of causing the lysis of approximately one billion times as many organisms as were injected intracutaneously. Yet, when this quantity of bacteriophage was injected intravenously, even within two minutes after the organisms were injected intracutaneously, the lesions progressed as they did in the control animals not receiving the intravenous injections.

In test tube experiments, the occurrence of strains of bacteria resistant to the action of bacteriophage is frequently observed. There is a possibility that resistant strains may also develop in the animal body, and such a factor might at least theoretically interfere with successful results from bacteriophage therapy. However, in the experiments here reported,

*Received for publication July 13, 1931.
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there was no evidence of the development of resistant strains *in vivo*. When lesions that had been treated either intravenously or locally with bacteriophage were incised and the contents plated so as to yield single colonies, in no instance were transplants from these single colonies resistant to the action of the bacteriophage. The results were always the same in this respect, regardless of the interval of time between the injection of the staphylococci and treatment with bacteriophage.

It was only when bacteriophage and culture were mixed together prior to injection that any effect of bacteriophage on the resulting lesion could be observed. Here the effect was definite and clear cut, even when the injections were made one minute after mixing, a period of time so short as to render improbable the occurrence of lysis prior to injection. In these particular experiments, 0.5 c. c. of culture and 0.5 c. c. of bacteriophage were mixed and injected intracutaneously, the resulting lesion being compared with a control produced by the injection of the same quantity of culture mixed with 0.5 c. c. of sterile broth. The lesions were, however, not entirely suppressed by this simultaneous injection of bacteriophage. Twenty-four hours after injection there was as much erythema at the site of injection as there was at the control areas. The characteristic effect of bacteriophage was that the lesions were much smaller, and at the end of seven days were entirely healed, or else covered an area not greater than one-fourth that of the control. This effect of bacteriophage in rendering the resulting lesion much smaller and in accelerating healing when injected simultaneously with the bacteria was still observable when the bacteriophage was diluted 1:1,000. At greater dilutions the bacteriophage had no effect on the lesion. This was a specific bacteriophage effect, for bacteriophage caused no resulting inhibition of the lesion when mixed with resistant strains. Greater details concerning these experiments relating to the simultaneous injection of bacteriophage and bacteria are given in another paper,[6] where I used the method for a comparison of the effect of bacteriophage and of chemicals.

An exactly similar investigation, giving results similar in all details to those described above, was carried out with the bacteriophage active toward hemolytic streptococci which was isolated by Schwartzman and a homologous strain of hemolytic streptococci. This strain of bacteriophage was kindly placed at my disposal by Dr. Schwartzman.

COMMENT

The results obtained in these experiments are practically similar to the results obtained in a previous work[7] relating to the effect of colon bacillus bacteriophage on a lethal dose of colon bacilli injected intraperitoneally into mice. The complete, or almost complete, absence of effect of bacteriophage *in vivo* seems to be amply demonstrated under the conditions of these experiments. Yet, it must be admitted that these experiments do not fully solve the problem. The bacteria used in all of these experiments were relatively avirulent for animals, and large doses were required to produce any sort of lesion. The lesions were possibly not true infections, since they may have resulted from the organisms injected rather than from any active multiplication of the organisms in the animal body. No bacteriophage was available which was active against more virulent organisms.

In my opinion, no definite experimental answer as to the possible value of bacteriophage in therapy can be obtained until experiments can be performed with bacteriophage active against highly virulent organisms. Two or three organisms of a virulent Type I pneumococcus suffice to kill a mouse or a rabbit. The result is a true infection. The few organisms injected have almost no toxicity and cause no visible reaction. Yet they increase to such numbers that the animal is killed. If a bacteriophage active against such an organism were available, it is entirely possible that a definite effect of bacteriophage *in vivo* could be demonstrated during the period when the organisms are rapidly increasing in numbers. The failure of the experiments as carried out by me could have been forecast by analogy with test tube experiments, for it is a well known fact that slowly growing bacteria are lysed by bacteriophage only with great difficulty. The staphylococci and streptococci used in my experiments obviously did not multiply in the animal

body at a very rapid rate; in fact, it is possible that barely any multiplication at all took place.

Bacteriophage and chemical germicides are used in therapeutics because they are agents capable of destroying bacteria. However, the criteria of experimental therapeutic effectiveness seem to be much more severe in the case of bacteriophage than in the case of chemicals. All of the experiments reported in this paper could be repeated with various chemical germicides instead of bacteriophage. The results would likewise be negative as far as indicating any beneficial result from the chemicals. As a matter of fact, it has been demonstrated that the chemicals are far more toxic for animal tissues than for bacteria, but that bacteriophage shows a true selective affinity for homologous bacteria.[6] Yet, chemical germicides are extensively used in therapeutics, particularly in the local treatment of wounds. However, there is no more in the way of animal experiments to support either the local or general use of chemicals in the treatment of infectious diseases than there is to support the use of bacteriophage.

SUMMARY

The intravenous or the local injection of bacteriophage had no effect on lesions produced by the intracutaneous injection of staphylococci or of hemolytic streptococci. When bacteriophage was mixed with the organisms immediately prior to injection, there was partial suppression of the lesion. It is pointed out that these experiments do not afford a final answer as to the value of bacteriophage in therapeutics, since the organisms were relatively avirulent. Similar experiments should be repeated with more violent organisms which multiply rapidly in the animal body, similar to the conditions necessary for lysis *in vitro*. Attention is also called to the fact that even now the use of bacteriophage rests upon as firm a theoretical foundation as does the use of chemical germicides.

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REPORT OF A CASE OF MONOCYTIC LEUKEMIA*

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The study of cases of leukemia by means of the supravital method[2] is a relatively recent development and there are but few cases reported in the literature which have been studied with this technic.[5] One of the most valuable assets which this method offers to the student of blood is a more exact identification of monocytes, and it is certain that numerous cases of monocytic leukemia have been missed because of the lack of specificity obtainable in regard to the monocytic group by use of methods involving fixation of the cells. The case to be reported here illustrates this point. The classification of the abnormal cells in the circulating blood was difficult even with the supravital method, but quite impossible by means of any of the fixed types of staining. The essential monocytic character of the condition was clearly demonstrated by the supravital studies on the blood. The question of whether it is legitimate to consider this case a true leukemia or simply a peculiar hyperactivity of the monocytic analgen is very difficult. Examination of the post mortem material strongly indicated a true leukemia but, as will be seen, did not finally settle the question beyond some legitimate doubt.

The patient, Mrs. E. D. T. (Hospital No. 3157), was a 60-year-old widow. She was admitted to the Vanderbilt Hospital on July 10, 1930, complaining of discolored spots on her skin.

Past History.—Her present illness was not connected with any record obtainable in her past history. Her health, for the greater part of her life, had been excellent. There was no history of any abnormal bleeding. She had been examined in the Vanderbilt Hospital on two previous occasions and no evidence of the changes which accompanied her final illness was found. Her first admission was in February, 1927. At that time a cholecystectomy was performed and her recovery was uneventful. In November, 1929, she was admitted to the Hospital complaining of uncomfortable sensations in her lower abdomen; at that time physical examination revealed nothing abnormal except a spastic transverse colon. Her blood count showed a mild ane-

*Received for publication July 8, 1931.

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mia with red blood cells at 3,900,000 and a hemoglobin of 90 per cent. She had 5,500 white blood cells. A differential count, made on a Wright's smear, showed 65 per cent neutrophils, 30 per cent lymphocytes and 5 per cent monocytes. Her basal metabolic rate was + 9 per cent. Her gastric juice was normal, there being 32° of free hydrochloric acid. All symptoms disappeared without treatment, and she was discharged from the Hospital without any specific diagnosis. The impression was that she had no pathological condition.

Present Illness.—For six weeks prior to admission she had noticed small discolored areas scattered over her body, but had thought, up to the last two weeks, that they had resulted from bruises. During the previous two weeks she noticed that they appeared without any physical trauma and that they had increased progressively in number. She had noticed some palpitation of her heart and a general asthenia which had been increasing gradually for several weeks.

Physical Examination.—The skin was smooth and of a sallow lemon color. There were large ecchymoses on the outer surface of the left forearm, on the left thigh, and on the left hip. The largest of these was approximately two inches in diameter. They varied considerably in color; some of them were blue and others a yellowish green. Below the knees there were myriads of petechial hemorrhages. The eyes were prominent and there was marked myopia. The thyroid gland was not enlarged. The heart and lungs were normal. Blood pressure was 140/80. The peripheral blood vessels were soft and easily compressed. The abdomen was normal. Except for the purpuric spots the extremities showed no abnormalities. All reflexes were equal and active. There was no enlargement of the lymph nodes. The liver and spleen were not palpable.

Laboratory Examination.—The urine was normal. Red blood cells numbered 1,420,000, the white blood cells 7,320, and the hemoglobin was 35 per cent (Sahli). Differential count by the supravital method[2] was as follows: neutrophils 15 per cent, basophils 0.5 per cent, eosinophils 1 per cent, lymphocytes 41 per cent, monocytes 41 per cent, and myelocytes 1 per cent. The platelets numbered 45,000. The clotting time was 7.5 minutes. The bleeding time was 4 minutes. The Wassermann and Kahn reactions were both negative. X-rays of the femora and ribs showed no evidence of pathological lesions.

The immediate diagnosis which was suggested by this study was a thrombocytopenic purpura accompanied by a marked secondary anemia. It was thought that these changes had resulted from a primary hyperactivity of the reticuloendothelial system. It seemed quite possible that, accompanying this change in the reticuloendothelial apparatus, an increase in monocytes had occurred. A true monocytic leukemia was considered as a definite possibility, but the relatively normal number of white cells and the fact that the monocytes were qualitatively quite normal, did not indicate leukemia as strongly as the diagnosis given above. It was, of course, somewhat difficult to decide whether to consider the anemia or the thrombocytopenia as the primary condition. However, by postulating a marked increase in the phagocytic activity of the cells of the spleen and liver, which in turn would explain the destruction of red cells and platelets, this difficulty seemed to be met.

With these ideas in mind, the wisest treatment seemed to be the administration of liver and iron, with the hope of relieving the anemia, and of viosterol[4] combined with transfusions to increase the platelets. X-ray therapy was considered because it is known that carefully controlled doses will sometimes reduce reticuloendothelial activity. The danger accompanying the use of x-rays, in cases of purpura, was, however, thought to be sufficiently great to necessitate considerable caution in this regard and therefore x-ray treatment was not used until everything else had failed.

Accordingly the patient was put on a high protein diet with 300 grams of whole liver and liver extract to the equivalent of 300 grams daily. During the next eleven days she received five transfusions of citrated blood of 500 c. c. each. At the end of that time her blood picture was as follows: red blood cells 3,560,000, white blood cells 12,920, hemoglobin 76 per cent, platelets 65,000, neutrophils 16.5 per cent, lymphocytes 49 per cent, monocytes 32 per cent, myelocytes 2.5 per cent. There had been no appreciable increase in the reticulocytes. During the following two weeks there was very little change in the blood picture. But by August 6 the white cells had increased to 21,080 with the differential count remaining about the same. The platelets had increased to 98,000 and there were a few more erythroblasts than had been seen previously. The monocytes had increased considerably in total number. By August 19, however, a very marked change had taken place in the blood. On this date, the total white count was 36,000, the increase being largely accounted for by young cells. These young cells were about equally divided into two groups. One group was made up of cells which contained mitochondria, but no neutral red vacuoles. The cells of the other group contained both mitochondria and neutral red vacuoles. In most of the cells of both groups the mitochondria were quite small. In some of the cells, which did not contain any vacuoles staining with neutral red, the mitochondria were decidedly larger. In most of these cells the neutral red vacuoles were salmon brown in color; on standing for 40-50 minutes they changed to a somewhat deeper red. The cells containing both mitochondria and vacuoles were considered to be young monocytes. They differed quite sharply from the typical myelocytes, which were present, in the irregularity in the size and distribution of the neutral red vacuoles. Most of the myelocytes present were in the C stage[1] and there were very few typical B myelocytes seen at any time. It was, therefore, felt that the young cells which contained only mitochondria were probably monoblasts. The grouping of all these cells in the monocytic strain suggested very strongly that the case was one of monocytic leukemia which was showing a rapid increase in the younger members of the series. We were forced, however, to consider another possibility; that we had brought about a marked stimulation of the primitive cells of the spleen and marrow by the administration of large quantities of liver and that we were obtaining a response dependent upon this stimulation. This concept was the outgrowth of studies[3] on the effect of intraperitoneal administration of liver on the production of monocytes. Such a finding has not been customary in liver therapy in anemia. The subsequent course of the case did not bear out this hypothesis, since there was a marked diminution in the total white cell count late in the course of the patient's stay in the Hospital while the liver therapy was still being maintained. Considering all the factors outlined above, the diagnosis was evidently either mono-

TABLE I

	Red Blood Cells	Platelets	White Blood Cells	Neutrophils	Basophils	Eosinophils	Myelocytes	Lymphocytes	Monocytes	Monoblasts*
July 11, 1930	1,420,000	45,000	7,320	1,135	37	72	73	3,001	3,001	0
July 13, 1930	2,910,000	.....	5,020	1,757	0	0	0	828	2,435	0
July 15, 1930	3,140,000	65,000	9,760	1,805	0	98	0	2,977	4,880	0
July 18, 1930	3,780,000	.....	17,400	2,610	0	0	609	8,178	4,959	1,044
July 21, 1930	3,560,000	65,000	12,920	2,132	0	0	323	6,331	4,134	0
Aug. 6, 1930	3,630,000	98,000	21,080	3,267	106	843	0	10,540	6,324	0
Aug. 19, 1930	4,100,000	40,000	36,000	6,660	0	0	1,260	7,020	9,360	11,700
Aug. 29, 1930	3,200,000	70,000	11,600	2,842	0	58	116	4,292	2,726	1,566
Sept. 3, 1930	3,110,000	51,000	16,000	.....	.....	.....	.....	.....	.....	.....
Oct. 3, 1930	.....	56,000	18,400	1,656	0	92	920	6,072	3,220	6,440
Oct. 13, 1930	1,970,000	52,000	20,800	2,808	0	0	1,248	4,576	2,912	9,256
Oct. 17, 1930	1,440,000	60,000	.....	.....	.....	.....	.....	.....	.....	.....
Oct. 29, 1930	3,120,000	84,000	18,200	3,822	0	0	455	5,915	3,185	4,823
Nov. 8, 1930	.....	64,000	12,160	2,918	0	0	851	4,256	1,703	2,432
Nov. 17, 1930	.....	66,000	10,800	2,385	0	108	434	2,710	2,710	2,493
Nov. 26, 1930	3,300,000	44,000	15,200	2,584	0	0	1,064	4,408	4,256	2,888
Nov. 30, 1930	.....	75,000	14,840	965	0	74	594	7,568	3,413	2,226
Dec. 6, 1930	.....	88,000	17,600	2,816	0	176	1,936	5,808	2,288	4,576

*This includes all the young cells of the monocytic series.

All differential counts included in this table were made by the supravital method.

cytic leukemia or hyperactivity of the reticuloendothelial system, which in turn produced the anemia and the thrombocytopenia.

Course of Patient in Hospital.—From day to day the patient's condition changed very little. Showers of petechial hemorrhages continued to appear and disappear. There was intermittent bleeding from the mucous membranes. The liver, spleen and lymph nodes showed no enlargement. Transfusions maintained the hemoglobin in the vicinity of 55-65 per cent. After a considerable amount of discussion it was felt that no progress was being made and it was decided to increase the number of transfusions with the idea of increasing the red cells and platelets as much as possible before beginning x-ray therapy. Transfusions were given at about weekly intervals from October 13 to November 23, when the red blood cells were 3,300,000 and the hemoglobin 65 per cent. On November 28, with some trepidation and much care, a 5 per cent skin erythema dose of x-ray was given over the spleen, and on December 3 the dose was repeated. Within a week there was very marked qualitative improvement in the blood picture, but very little change in the total or differential counts.

On December 8 the patient suddenly became unconscious, her respirations became stertorous and she was found to have widely dilated unequal pupils, a left facial paralysis and a blood pressure of 200/110. Lumbar puncture showed grossly bloody fluid with a pressure of 300+ mm. The patient died within a few hours.

Autopsy Report.—At autopsy the pertinent findings were limited to the serous surfaces, the spleen, the liver and the bone marrow. Permission to examine the brain was not obtained.

Myriads of submesothelial hemorrhages speckled the visceral and parietal layers of the peritoneum, the pleura and the pericardium. The spleen weighed 280 grams. The capsule was reddish gray. The splenic tissue was extremely soft and flabby. The volume was much greater than one would expect from the weight. The pulp was so soft that it tended to drain out upon standing, leaving a honey-combed surface. The liver weighed 1920 grams. The left lobe was deep brown in color, the right was definitely paler. The cut surface was smooth in appearance and the capsule was not adherent. The bone marrow of the ribs was almost completely absent, the little that remained being of a grayish color. For the most part only empty interstices were present between the greatly thickened medullary bony spicules. The femoral bone marrow was very soft and friable and definitely yellow in color. There was no diminution in the amount of femoral marrow.

When examined in sections the bone marrow of the femora was markedly hyperplastic, the cavities being filled with a mass of round cells about the size of the average intermediate lymphocyte. Their cytoplasm stained basophilic, but not as deeply so as that of the early primitive cells of normal marrow. Megakaryocytes were rare and the younger members of the red cell series were markedly reduced in number. Sections of lymph nodes contained many cells similar to those described above. The splenic pulp was packed with similar cells and the structure of the spleen was markedly distorted. The sinuses of the liver were distended with blood and there was considerable evidence of

phagocytosis on the part of the lining cells of the sinuses in both liver and spleen.

From these observations we interpreted the low erythrocyte count as being the result of the overgrowth of the cells described above which had occupied all of the available space and had produced a marked hypoplasia of the erythrocytic analgen. While there was considerable phagocytosis on the part of the lining cells of the liver and spleen, it was not sufficient to account for the marked reduction in red cells and platelets. It, therefore, seemed definite that the primary nature of the disease was hyperactivity of some one type of the white cell series and, from the study of the living cells, that this was the monocytic strain. We, therefore, interpreted the large number of round cells present in marrow, spleen and lymph nodes as monoblasts and young monocytes. There was very little actual invasion of the framework and capsule of the spleen or lymph nodes, but there was some distortion apparently from the pressure of the extremely active growth of these cells.

The total white cell count was never above 36,000 and reached this level only once; in general, during the major part of the patient's stay in the Hospital, it averaged between 15,000 and 20,000 cells. This number of white cells is low for true leukemia and yet there seems to be no other category in which it is possible to classify this condition. It is without doubt an overgrowth of the monocytic strain of cells, but the process was certainly not malignant, if one uses invasion as the principal criterion, and there was much less escape of the primitive cells into the circulation than would be expected from the enormous overgrowth present in the spleen, bone marrow and lymph nodes.

Whether this evidence is sufficient to consider this case as being a true leukemia it is somewhat difficult to say, but it is certainly very definite as indicating a marked hyperplastic activity of the monocytic cell series. That it is the monocytic group involved seems unquestionable, and it is only in the exact definition of leukemia that any question arises.

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LABORATORY EQUIPMENT FOR THE SOUTHERN PHYSICIAN*

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This article has been prepared in response to many inquiries received from individual physicians and groups of physicians, requesting information as to how a clinical laboratory should be constructed, what equipment is necessary, how it should be staffed, what procedures should be attempted, and other points of interest in its conduction.

In this discussion we plan to outline in detail how a laboratory should be constructed and what it should cost, bearing in mind that the expenditures should be restricted to a minimum, consistent with the necessary equipment for thorough work.

The value of laboratory assistance in the diagnosis of disease is recognized by every modern trained physician. Indeed, some of the younger doctors now taking their hospital work, look with fear and apprehension on the possibility of being isolated in their practice where laboratory services are not available.

Laboratory findings, of course, should never reach that state of importance in the mind of the clinician where he relegates clinical data to the background; but it must be admitted that diagnosis in a few diseases is well-nigh impossible without laboratory assistance, and it also cannot be denied that laboratory findings are of some importance in practically all diseases.

Those physicians practising medicine in the larger cities or in communities where there is a hospital, experience little difficulty in obtaining the aid of a laboratory. Furthermore, certain laboratory procedures are available to every physician through the state laboratory. This as-

*Received for publication October 29, 1931.

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sistance, however, is restricted in scope and character and is usually confined to those procedures having to do with public health activities. The small town and country practitioner have to send their work to private laboratories with the necessary attendant delays, or establish their own laboratory as an individual or group enterprise. The latter plan seems to be fast becoming popular, since it is evident that such procedures as blood counts, gastric analyses, blood chemistry, can be carried on only in the immediate vicinity of the patient.

The average physician who has not access to laboratory services usually attempts to do his own work, which, of course, is limited in character and quantity by his limitations in training and disinclination for the work. He would far rather turn over his laboratory work to another person, since his chief interest and all of his time is devoted to the practice of clinical medicine. How, then, can he obtain this aid?

The answer seems to be the establishment of a laboratory by a group of physicians in a community and the employment of a thoroughly trained and competent technician to conduct it for them. Such a laboratory can be established by a single physician, by a group, or even by the county medical society. The latter suggestion may sound somewhat like advocacy of state medicine, but insofar as laboratory work is concerned, state medicine has long since made its inroads, rolled over that specialty, and has left only a shell of what once was a highly specialized group.

This might be well illustrated by quotations from the 1930 annual report of the Director of the Cayuga County Laboratory, New York,[1] in which he states:

"The service of the laboratory is not confined to the rooms in which it is housed, but is carried by the Director to every hospital in the county, and to every home, even in the remote parts, when he is called by any physician of the county, day or night and any day in the week, to assist in caring for the sick of the county."

Study of this remarkable report reveals that this service is utilized by every resident of the county, regardless of his ability to pay, and shows that the laboratory procedures are not restricted to the usual ones concerned with public health activities, but include everything that can possibly be included within the province of a clinical laboratory. Among these may be mentioned the following: urine examinations, blood chemistry, blood counts, blood typing, autogenous vaccines, animal tests, tissue diagnosis, postmortem examinations, kidney and liver function tests, basal metabolism, electrocardiograms, and any other procedure that may be requested. So far as laboratory aid is concerned, this county must be a veritable paradise for the practising physician.

Contrast the above situation with that in the State of Georgia, which has one state laboratory with a yearly budget that closely approximates that of Cayuga County, New York; a laboratory whose services are restricted to the examination of specimens only of public health interest, leaving the general practitioner a large list of procedures that he is unable to utilize because of lack of laboratory and personnel with which to carry them out.

WHO SHALL DO THE LABORATORY WORK?

According to the Secretary of the Section on Pathology of the American Medical Association,[2] there are now just over 200 qualified pathologists in the United States. There are over 6,000 hospitals, each of which theoretically requires the service of a pathologist, but only a few of which have access to these services. It is evident, therefore, that the small town laboratory discussed in this paper cannot have the services of a trained laboratory director, except, perhaps, in a consultant capacity. It is also true that no laboratory should be left entirely in the hands of a non-medical technician, no matter how competent she may seem to be. Therefore, in the proposed laboratory, one member of the group should be appointed as the director, with the chief duty of exercising general supervision of the activities of the technician, and more specifically with the duty of restricting the scope of work, so that one who is untrained in medicine should strictly limit her endeavors to that field in which she is known to be capable.

The technician is the most important instrument in the laboratory. Oftentimes, and perhaps in most instances, they are more capable of actually carrying out efficiently a given laboratory procedure than the director would be. Such an adeptness, of course, results from daily practice. In no sense, however, should they attempt to interpret the results of their findings, but their activity should be strictly limited in carrying out procedures requested by the physician.

In a period of twelve months, a girl of ordinary intelligence and high school education, can

be trained to carry out competently the laboratory procedures in the average hospital clinical laboratory. Of course, it is desirable to have a technician whose preliminary education includes more or less college work, and whose period of training exceeds twelve months, but it is also true that such a trained worker, like a young, seven-year trained doctor, is reluctant to go to the small towns and, for various reasons, prefers to remain in the larger institutions of the city. So the question arises as to where the services of a competent technician who is willing to live in a small town on a modest salary are to be obtained. In this connection, I quote from a recent statement of a large medical placement agency:[3]

"Approximately 400 technicians for whom we are unable to find positions are registered with us at this time. The experience of some of this group is very limited, ranging from none at all to a few months in a doctor's office. Salaries they request, as a rule, average $100 per month. They are capable of carrying out blood counts, urinalysis, sputum examinations, feces examinations, gastric analysis, and simple bacteriological procedures according to the formulae which they have been taught. Many do not understand the formulae, however, nor are they capable of doing new procedures, other than under rigid direction."

The director of this agency realizes quite well the chaotic situation that exists as regards ill-trained laboratory technicians, knowing that many of those registered for positions are products of commercial schools whose chief purpose is to turn out large numbers of graduates for exorbitant tuition fees. This particular agency has been very cooperative with various committees of scientific organizations attempting to correct this situation, and no longer registers those who are not qualified thoroughly.

The problem of the technician, therefore, must be solved by the group itself. In our opinion, the answer lies in the town in which the laboratory is to be established. We would suggest that the group select an honest, capable and well-educated girl or woman in the community and send her to a recognized school for training in the laboratory field, with the express understanding that she is to return to her home town and carry on this work for the group and community. It would be quite easy for such a person to be found, one whose home ties are such that, during her year's training, she would not be weaned away, but would be quite willing to return and work in an atmosphere of satisfaction and contentment for a modest and reasonable salary, among her friends and for the service of the community.

ESTABLISHMENT OF THE LABORATORY

One of the chief purposes of this article is to correct the impression prevalent among physicians that a well-equipped laboratory is very expensive. This idea undoubtedly prevents many physicians from establishing their own laboratory. It can be seen from *Table I* that almost every laboratory procedure of diagnostic importance may be efficiently carried out with the equipment designated. After all, the most important laboratory procedures can be well done with a slide, a test tube, a flame and a microscope by a competent worker.

TABLE I

LABORATORY EXAMINATIONS IN THE AVERAGE HOSPITAL LABORATORY

*†	Sputum, gross examination
*†	Sputum for tubercle bacilli
*	Sputum, bacteriological, by smears
*	Sputum, typing pneumococci
*	Urine, qualitative chemical (acetone, bile, sugar, albumin, indican, diacetic acid)
*	Urine, microscopic, unstained
*	Urine, microscopic, stained
*†	Urine, bacteriological, by cultures
*	Urine, quantitative sugar
*	Urine, quantitative albumin
*	Urine, kidney function test
*	Urine, for blood
*	Blood, coagulating time
*	Blood, bleeding time
*	Blood, hemoglobin estimation.
*	Blood, counting red cells
*	Blood, counting white cells
*	Blood, differential counts
*	Blood, color index
	Blood, volume index
	Blood, platelet counting
*†	Blood, study of stained film
*†	Blood, for malaria
*	Blood, typing and matching
*	Blood, quantitative sugar
*	Blood, quantitative non-protein nitrogen
	Blood, quantitative urea nitrogen
*	Blood, quantitative uric acid
*	Blood, quantitative creatinine
	Blood, quantitative chlorides
	Blood, quantitative calcium
*†	Blood, bacteriological cultures
	Blood, for bile pigment (icterus index—Van den Bergh)
*	Blood, liver function test
	Blood, vital staining for reticulocytes
*	Blood, fragility of corpuscles
	Blood, sedimentation of corpuscles
*	Gastric contents, collecting specimen
*	Gastric contents, gross examination
*	Gastric contents, chemical examination
*	Gastric contents, microscopic
*†	Feces, gross examination
*†	Feces, for parasites and ova
*	Feces, for blood, pus and mucus
*	Feces, bacteriological by stains
*	Feces, bacteriological by cultures
	Feces, for pancreatic ferments
*	Feces, for amebae
*	Spinal fluid, cell count
*	Spinal fluid, globulin
	Spinal fluid, colloidal gold
*	Spinal fluid, mastic test
*	Spinal fluid, quantitative sugar
	Spinal fluid, cytodiagnosis
*†	Spinal fluid, bacteriological
*	Spinal fluid, Kahn reaction
†	Spinal fluid, Wassermann reaction
	Pleural fluid, cytodiagnosis

*Examinations which can be carried out in the laboratory described in this paper.

†Examinations available at the state board of health laboratories.

*Pleural fluid, bacteriological
*Pus and exudates, microscopic
*Pus and exudates, cultures
Peritoneal fluid, cytodiagnosis
*Peritoneal fluid, microscopic
Peritoneal fluid, cytodiagnosis
*Pericardial fluid, microscopic
Animal inoculations
*†Throat smears, diphtheria
*Throat smears, bacteriological
*†Throat cultures, diphtheria.
*Throat cultures
*†Buccal lesions for Vincent's organisms
*†Darkfield examination for treponema
*Ear smears, bacteriological.
*Eye smears, bacteriological
*†Milk, standard plate counts
*†Milk, bacteriological
†Milk, for fat, protein, and carbohydrate
*Semen, for spermatazoa
Aschheim-Zondek test for pregnancy
*†Brain for rabies
*†Widal reaction, microscopic
*†Widal reaction, macroscopic
Precipitins, tests for
†Wassermann reaction
*†Kahn reaction for syphilis
*†Agglutination test for undulant fever
*†Agglutination test for tularemia
*†Agglutination test for typhus fever
*†Smears for gonicocci
Autogenous vaccines, preparation of
Skin tests for sensitivity
Basal metabolism determinations
Tissue for diagnosis
Postmortem examinations
*†Water, bacteriological

A small room, preferably lighted on two sides, containing a table, a drawer, a few shelves, gas, electric and water connections, is ample for the ideal laboratory. Gas is not necessary, and in substitution we have listed a blast heater for sterilizing purposes and an alcohol lamp for other work. In *Fig. 1* is shown a very satisfactory equipment, consisting of a table built in

Fig. 1

Laboratory Completely Equipped as Outlined in this Paper

(1) Room, 10 x 14 feet, buff colored walls.
(2) Single electric light, 100 watts.
(3) Single window, sufficient for daylight.
(4) Radiator placed beneath work table to save space.
(5) Built-in sink with one plain and one screw faucet.
(6) Two-door cabinet for storing large apparatus.
(7) Sliding glass door cabinet. Upper half of glass painted black.
(8) Drawer for pipettes, small glassware, filter paper, etc.
(9) Microscope box for microscope while not in use.
(10) Five-gallon bottle for distilled water.
(11) Rack with stains in drop bottles.
(12) Reagents for urinalysis.
(13) Equipment for microscopic work.
(14) Centrifuge on concrete block in the corner.
(15) Autoclave on gas burner.
(16) Small electric incubator.
(17) Dubosque colorimeter.
(18) Trip balance.
(19) Steel frame, wood top, adjustable stool.
(20) Urinalysis reagent bottle with petcock at the base.
(21) Tray set up for blood work.

Fig. 2

(1) One pint cardboard carton for test tubes, cultures, etc.
(2) Suitable Bunsen burner with attached tip for natural gas.
(3) Four-ounce pyrex nursing bottle for blood cultures.
(4) Efficient microscope lamp with cord attached.
(5) Substage darkfield with light. Uses same plug as that in microscope lamp.
(6) Monel wire to place across corner of sink for staining.
(7) Suitable platinum wire holder.
(8) One-half-pint cardboard carton for specimens of sputum, feces and urine.
(9) Wide mouth bottle for specimens of tissue.
(10) Glass slide with double concavity.

on two sides, on which rests a glass door cabinet, and beneath which is storage space for large equipment. Such an equipment can be built and installed by any good carpenter. The table surfaces should be acid proofed* and approximately 36 inches from the floor. A revolving and adjustable stool is needed for microscopic work.

In *Table II* is a complete list of all equipment necessary to carry out the procedures listed in *Table I*. In this list are such items as autoclave, microscope, basin, boiler, applicators and syringes, most of which the average physician has in his office, and which, of course, can be deducted from the total estimated cost. We would recommend to any prospective purchaser a binocular microscope, the advantages of which are many. The cost is little more than that of a single tube instrument (*Figs. 1, 2, 3, 4*).

An efficient steam pressure autoclave, when purchased from the ordinary laboratory supply house, is rather expensive. A steam pressure cooker that is equally efficient can be obtained from Sears-Roebuck Company at one-third to one-half the usual price. The largest size costs less than $20.00 and the capacity is 22 quarts. Small items, such as glass beads, double boiler, basin, and glasses, can be obtained from local five and ten cent stores. Cardboard cartons, bottles for reagents, corks, and many solutions can be obtained from the local druggist. All stains and quantitative reagents, however, should be purchased ready for use, and are so listed. Though the cost is a little more, one is repaid by accuracy of results, and is especially desirable if the laboratory is being conducted by a technician whose training does not include sufficient chemistry and mathematics to accurately prepare quantitative reagents. In many cases where volumetric technic is employed, the correct preparation of the standard solution is the most difficult part of the procedure. With correctly standardized solutions, a laboratory technician can easily follow analytical technic and attain accurate results.

A sufficient quantity of stains and reagents to carry on the work for a short period has been included in the list. These should be purchased in small quantities, since many of them deteriorate slightly with age.

We have asked a Southern laboratory supply

Fig. 3

A Tray Equipped for Blood Work

(1) Wide mouth bottle for cotton.
(2) Wide mouth bottle for Wassermann tubes.
(3) 95 per cent alcohol.
(4) Tincture of iodine.
(5) White cell diluting fluid.
(6) Red cell diluting fluid.
(7) Blood culture medium.
(8) Needle lancet in cork of vial of alcohol.
(9) Tallquist hemoglobin scale.
(10) Small rubber tubing for tourniquet.
(11) Red cell and white cell counting pipettes.
(12) Plain glass slides.
(13) Syringe (10 c. c.), sterilized, needle attached, wrapped in alcohol saturated cotton.
(14) White towel over a metal tray.

*Solution No. 1:

Copper sulphate	125 gm.
Potassium permanganate	125 gm.
Water	1000 c. c.

Solution No. 2:

Anilin oil	120 c. c.
Hydrochloric acid, conc.	180 c. c.
Water	1000 c. c.

Directions: Apply two coats of No. 1 (hot), then two coats of No. 2 without heating, allowing each to dry thoroughly. Remove the excess after the last coat by rubbing with a coarse cloth. Finally rub with a mixture of equal parts of turpentine and linseed oil.

Fig. 4
A two-level, acid-proofed wood rack for stains and indicators.

company to submit quotations for the cost of all equipment and reagents. These figures are shown in *Table II*, and any items may be deducted without affecting the price of the remainder. These prices are made in accordance with the present market and, of course, will fluctuate slightly from time to time. As a whole, however, it offers an approximate cost of the equipment (*Table II*).

TABLE II

Equipment

	Article	Price
1	albuminometer, Esbach	$ 1.00
1	box of applicators	.40
1	autoclave (pressure cooker), 22 qt.	19.50
1	balance Harvard trip	11.00
2	beakers, Pyrex, 250 c. c.	.50
1	bottle for immersion oil	.50
1	2-gal. bottle for water	.75
6	bottles, large, reagent, 32 oz.	3.50
12	bottles, drop—60 c. c.	4.50
1	bottle with opening at base, for Benedicts	2.00
12	bottles—4 oz. nursing, Pyrex	1.20
12	bottles, small, 500 c. c. capacity, for reagents with ground glass stoppers	4.00
12	bottles, wide mouth for tissues	.75
1	bunsen burner	.35
1	bunsen burner tip for natural gas	.15
1	bunsen burner (micro)	.50
1	boiler, 2 qt.	.25
½	gross cartons, ice cream, ½ pt.	.50
1	centrifuge, electric	110.00
1	Chapman pump, medium	1.25
4	concave slides (double concavity)	.50
1	lb. cotton, absorbant	.40
½	oz. cover glasses, No. 1, 22 mm.	.50
100	corks to fit bottles, assorted	.50
1	darkfield (Spencer)	29.75
1	evaporating dish, 60 ml.	.15
1	enamel basin, white	.15
1	pkg. filter paper, plain rapid filter	.25
12	flasks, 200 ml., pyrex, Erlenmyer	2.40
1	flask, 500 ml., pyrex	.30
1	flask, 100 ml., pyrex	.45
1	file, triangular	.15
1	funnel, 10 cm. diameter	.40
1	graduate cylinder, 100 ml.	.50
1	graduate cylinder, 1000 ml.	1.25
1	gas plate	2.50
3	glasses	.10
1	hemocytometer, American standard with Levy Hauser counting chamber, Neubauer ruling, 2 pipettes	12.80
1	hemometer, Sahli	10.00
1	incubator, electric	36.00
1	lancet for blood sticking (Hagedorn needle in bottle)	.10
1	box labels for reagent bottles, size 201	.10
1	box labels for micro slides	.15
1	pkg. lens paper	.15
	Litmus paper, blue, 100 strips in vials	.10
	Litmus paper, red, 100 strips in vials	.10
1	medicine dropper	.05
	Microscope, binocular with mechanical stage, 16-4-1.8	174.00
	Microscope lamp complete, with current breakers	15.75
1	doz. needles, B rustless, hypodermic	1.88
12	petri dishes, 100 by 15 mm.	2.50
1	platinum loop and holder	1.25
2	pinch cocks	.35
2	pipettes, 10 c. c., graduated, precision grade	2.50
4	pipettes, 1 c. c., precision grade	3.00
1	Rehfuss tube and syringe	2.00
6	feet rubber tubing ¼ by ⅛ in.	.50
12	feet rubber tubing ¼ by 1/16 in.	.75
1	ring stand with rings	1.00
3	syringes, 2 c. c., 5 c. c., 10 c. c., Luer	3.50
½	gross glass slides, 75 by 25 mm.	.75
1	slide box, 100 slides	.75
24	test tubes, 5 by ¾ in. with lip	5.00
2	test tube racks	1.00
1	test tube clamp	.15
1	test tube brush	.10
12	Wassermann tubes	.25
1	tripod	.40
	Tallquist scale for hemoglobin determinator	1.00
	Thermometer, centigrade	1.00
25	tubes, bacteriological, 4 by ⅝ in.	.50
	Urinometer, Squibb, cylinder and spindle	1.00
1	watch glass	.10
1	wax pencil	.15
	Weights, 10 mgs. to 100 gms.	5.00
1	wire gauze with asbestos center	.15
1	wire basket, 5 by 4 by 6 in.	.90

Apparatus for Special Tests

	Dunning colorimeter	6.00
4	digestion tubes, Folin, 35 and 50 ml. pyrex	3.00
6	blood sugar tubes, 25 ml. pyrex	4.80
1	colorimeter, B. & L., Dubosque	48.00
1	colorimeter, Rosenthal, H.W.&D.	12.50
1	volumetric flask with glass stopper, 100 c. c.	.75
2	funnels, 50 mm. diameter	.50
1	pkg. Whatman's filter paper, 8 cm. diameter	.22
6	Ostwald-Folin pipettes, 2 c. c.	2.70
1	lb. glass tubing, 4 mm. diameter	1.00
24	Kahn tubes	.40
2	Kahn tube racks, copper	5.50
12	Kahn pipettes, 2/10 ml.	3.60
	In case gas is not available, alcohol burner, 4 oz.	.75
	Blast burner	11.00
	Laboratory manual for reference: Approved Laboratory Technic, by Kolmer, J. A., and Boerner, Fred.; D. Appleton & Co., New York, 1931	7.50

CHEMICALS

Prepared Reagents

Quantity	Article	Price
4	oz. acetic acid 1 per cent WBC	$ .30
8	oz. alcohol, 95 per cent	.50
4	oz. alcohol absolute	.25
4	oz. digestion mixture	.50
16	oz. hydrochloric acid, normal	.75
2	oz. phospho-molybdic acid	.75
4	oz. picric acid, sat., Folin	.75
8	oz. sulphuric acid, 2/3 normal	.50
4	oz. alkaline copper, Folin	.50
16	oz. Benedicts' solution, qualitative	1.25
8	oz. Benedict's solution, quantitative	1.00
2	gms. benzidin	.20
8	oz. creatinine, standard	.50
8	oz. digestion mixture, Folin	.75
4	oz. Esbach reagent	.50
4	oz. Ferric chloride, 10 per cent	.25
4	oz. Folin and Wu glucose, standard No. 1	.75
4	oz. Folin and Wu glucose, standard No. 2	.75
4	oz. Hayem's for RBC	.50
16	oz. Nessler's, Folin and Wu, diluted	3.00
1	oz. nitrogen standard	.50
4	oz. Obermayer's reagent	.50
8	oz. sodium tungstate, 10 per cent	1.50
8	oz. sodium hydroxide, normal	.50
8	oz. sodium cyanide, 5 per cent	.50
4	oz. urea standard solution	1.25
1	oz. gum mastic solution	.25

Stains and Indicators

4	oz. Sterling's gentian violet	.50
4	oz. carbol fuchsin (Ziehl-Neelson)	.50
1	oz. dimethylamidoazobensol (Topfer's reagent)	.30
1	oz. Gabbett's methylene	.30
4	oz. Gram's iodine	.50
1	oz. Loeffler's methylene blue	.30
1	oz. phenolphthalein	.30
4	oz. safranin	.75
8	oz. Wright's stain	2.50

10 ampoules phenolsulphonphthalein (Hynson, Westcott & Dunning) for kidney function	1.25
6 ampoules bromsulphonphthalein, for liver function	2.00

Culture Media

1 lb. bacto-agar prepared medium Difco	3.00
1 lb. bacto-nutrient bouillon prepared medium Difco	8.00
½ lb. Kracke dehydrated blood culture medium Difco	3.50
¼ lb. Loeffler's dehydrated blood serum medium Difco	2.05
¼ lb. Endo's prepared medium Difco	2.25

CHEMICALS—Baker's

Quantity	Article	Price
1 lb.	acetic acid, glacial, c.p.	$ .61
1 lb.	ammonium hydroxide, c.p.	.35
¼ lb.	ammonium sulphate, c.p.	.40
½ lb.	anhydrous sodium carbonate, c.p.	.40
2 oz.	cedar oil for immersion	.50
1 lb.	chloroform	.54
1 gal.	distilled water	.50
¼ lb.	ether	.25
1 lb.	formaldehyde	.35
1 lb.	hydrochloric acid, c.p.	.53
¼ lb.	hydrogen peroxide	.10
½ lb.	potassium carbonate, c.p. anhyd	.37
¼ lb.	potassium oxalate, c.p.	.50
1 lb.	sodium chloride, c.p.	.40
¼ lb.	sodium nitroprusside, c.p.	1.46
1 lb.	talcum	.25
½ lb.	xylene	.50

Total cost	$633.81
Not including microscope	$459.81
Not including microscope and centrifuge	$349.81

Supplies obtainable from the state board of health or private laboratories:

Serum, for blood typing, types II and III
Cultures of *B. typhosus*
Culture of *B. proteus* X-19
Culture of *B. abortus*
Culture of *B. tularense*
Kahn antigen

THE SCOPE OF THE WORK

A study of *Table I* shows the procedures that should be carried out in the proposed laboratory. For completeness, all procedures of use in the usual hospital laboratory are included. Those obtainable at the state board of health laboratories are so designated. Wassermanns should not be attempted, and Kahn reactions should be carried out only when early reports are desirable. As much of the bacteriological work as possible should be referred to the state laboratory. This is particularly true of agglutination procedures, Widal reactions, identification of organisms, and in general any work requiring a high degree of bacteriological skill. Examination of milk and water, and of brains for rabies, should also be referred to the state laboratory. The equipment designated in this paper, however, is such that all of these procedures can be carried out in the laboratory, should the occasion justify it, presuming that the technician is capable.

Autogenous vaccines and tissues for diagnosis should be carried out by a competent pathologist. Since neither of these two procedures is obtainable from the state laboratory, nor, under any conditions, should they be attempted by the technician, they can be referred to private laboratories.

It is obvious that the success of the laboratory will be almost entirely dependent upon the ability of the technician who does the work. The most important duty of the director is to curtail the activities of the technician and see that laboratory procedures for which the worker may not be qualified, are not attempted. The operation of such a laboratory under these conditions will differ very little from that of a large hospital, where it is well known that 90 per cent of the work is carried out by technicians, nor from the average private laboratory where similar conditions prevail. As little as we may like it, we cannot escape the fact that it is impossible for all laboratory work to be carried out by a graduate physician, and most of it is being actually done by technicians, not only in the larger institutions, but in the smaller ones. This same type of service, therefore, is well indicated in the smaller towns and communities where at this time no such service exists. To reemphasize, the two important considerations for the success of such a laboratory are, first, the employment of a well trained worker, and secondly, medical supervision by a member of the group.

In conclusion, we should like to emphasize that this article is not offered as an ideal solution of the laboratory problem for the small town physician. It is merely a workable plan, which should prove successful, as demonstrated in many instances.

REFERENCES

1. Adams, G. B.: 1930 Annual Report Cayuga County Laboratory, Auburn, N. Y.
2. Moore, J. A.: Personal communication to the authors, July, 1931.
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Dedication of Duke University School of Medicine and Duke Hospital*

FOREWORD

The following pages are devoted to the dedicatory exercises which took place at the formal opening of the Duke University School of Medicine and the Duke Hospital in Durham, North Carolina, on April 20, 1931.

It is not necessary at this juncture to mention the years of work and planning of the late James Buchanan Duke, who made possible the establishment and maintenance of these institutions, nor of the burden placed upon those to whom he left the charge of bringing th's undertaking to its present point of completion. The history, though brief, of the founding of the Duke University School of Medicine and the Duke Hospital, and the importance attached to their establishment and the widespread influence it is hoped this venture in medical education will have, may be gathered from the addresses of those who were closely associated with the growth of the physical side of these institutions and from those who have been actively engaged in medical education and the moulding of medical thought in this country.

Duke University School of Medicine and Duke Hospital, Durham, North Carolina

PRESENTATION OF BUILDINGS*

By GEORGE GARLAND ALLEN,
President of the Trustees of the Duke Endowment and Chairman of the Building Committee.

Mr. James B. Duke, in the trust indenture of December 11, 1924, establishing The Duke Endowment, after making provisions for Duke University and various charitable objects, said, among other things regarding Duke University:

"I advise that the courses at this institution be arranged with special reference to the training of preachers, teachers, lawyers and physicians."

With reference to hospitals he said:

"I have selected hospitals as another of the principal objects of this trust because I recognize that they have become indispensable institutions, not only by way of ministering to the comfort of the sick but in increasing the efficiency of mankind and prolonging human life. The advance in the science of medicine growing out of discoveries, such as in the fields of bacteriology, chemistry and physics, and growing out of inventions such as the x-ray apparatus, make hospital facilities essential for obtaining the best results in the practice of medicine and surgery. So worthy do I deem the cause and so great do I deem the need that I very much hope that the people will see to it that adequate and convenient hospitals are assured in their respective communities."

In his will he bequeathed to The Duke Endowment the sum of $10,000,000 to be administered for the benefit of Duke University, and with respect to a part of that sum I quote the phraseology from his will as follows:

"Said Trustees shall use and expend as soon as they reasonably can after the receipt of said sum not exceeding $4,000,000 thereof in erecting and equipping, at the Duke University mentioned and described in said trust, buildings suitable for a medical school, hospital and nurses' home under the supervision of said Trustees and in all respects as they may determine concerning the same, and the acquisition of such lands, if any, as may be needed for such purposes, said lands, buildings

*EDITOR'S NOTE.—*Publication of these Dedicatory Exercises in the* SOUTHERN MEDICAL JOURNAL *is financed by a grant of funds from Duke University School of Medicine.*

and equipment to be conveyed to and thereafter belong to said Duke University and operated by it."

It now, therefore, becomes my great pleasure, on behalf of the Trustees of The Duke Endowment, into whose hands Mr. Duke committed this charge, to present to the Trustees of Duke University these Medical School and Hospital Buildings. Although Mr. Duke, who generously made possible the creation of these facilities, which will stand for generations to come as a testimonial to his deep love of humanity, is not present in body, unquestionably his spirit pervades this hall today, for did I not hear him say that he expected to be looking down upon this work one thousand years hence?

ACCEPTANCE OF THE BUILDINGS ON BEHALF OF THE TRUSTEES*

By COLONEL JOHN FLETCHER BRUTON,
President of the Board of Trustees.

Speaking for the Trustees, I accept the gift to Duke University of the structures erected by The Duke Endowment and just tendered in the name of the late James B. Duke for the use of the University School of Medicine and the Hospital. These buildings admittedly approach perfection in their construction and appointments. To the Trustees of The Duke Endowment unlimited praise is due and accorded for the painstaking service rendered by them. I beg to assure these gentlemen that their labors will not, cannot, be forgotten; for in their notably valuable, and yet self-effacing service, they have simply revealed the unerring judgment of our great benefactor in his selection of them as men who can do big things. This leads me to an inquiry:

Our benefactor—who was he? If we must judge by his commitments, it is safe to say that in some respects he was—just a man. In fact, this is revealed in the reading between the lines of a certain paper writing, recording after years of investigation and study his conclusions and commitments. It is clear that during these years more than once orphan children, some crying perhaps, some hungry, some laughing and singing, played about his knee; that in these years aged men and women, broken in the service of their father's God, were revealed to him as worthy of his remembrance; that on occasions he, in his imagination, visited hospitals and looked upon sick men, the beds whereon they lay, and upon those seeking admittance when there was no room. It is natural that these types should have appealed to him, because he was a man like you and me. The record shows that he made certain provision for them. It is interesting to note, however, that this provision was not absolute. Is it not true that little children, even orphans, grow into manhood and womanhood and sometimes forget; that old men and old women die and are forgotten; that sick men of the irresponsible class, if they get well, sometimes linger on as burdens to the state? There are those who do not thus reason, but I am tempted to believe that Mr. Duke did have some such thought. At any rate, we find him unsatisfied. To conclude with undertakings fenced about by human limitations, to abandon a struggle to overcome obstacles incident to human weaknesses, even death, sounded of failure to him. What followed is interesting. He dreamed a dream so great that to the average man it falls without the realms of possibility. He caught a great vision, the realization of which depends upon his discovery of the secret doors to faith and immortality. In accepting the challenge to make possible the fruition of that dream, the realization of that vision, he stepped outside the ranks of ordinary men.

Thus I read the document of record known as the Duke Indenture, having in mind that he spent ten of the ripest years of his life in the making. In it are to be found few limitations, and they are impersonal, fundamental, essential to the consummation of his life's undertaking. This document delivered without even the finger prints of a dead hand; vital, pulsating, expanding, appealing, will unceasingly demand and receive from those serving under its terms, devotion and self-sacrifice.

And thus Duke University was born. It is eminently fitting that the School of Medicine and the Hospital should have this first recognition, serving as the most practical human expression of Mr. Duke's interest in his fellow man.

Glorious in contemplation are the benefits, the expanding service, the refining influences, the uplift, the pains of new light and new life,

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*Address delivered at the Dedicatory Exercises of Duke University School of Medicine and Duke Hospital, Durham, North Carolina, April 20, 1931, publication in the Southern Medical Journal financed by a grant of funds from Duke University School of Medicine.

to be confidently expected from the operations of this school and hospital!

As the best and highest tribute to our benefactor and friend may I conclude with the old-fashioned and, therefore, eminently fitting, worshipful prayer—To our God, the God of his father, be all the glory.

GREETINGS FROM THE MEDICAL PROFESSION OF NORTH CAROLINA*

By THURMAN DELNA KITCHIN, M.D.,
President of Wake Forest College,
Chapel Hill, N. C.

President Few, Ladies and Gentlemen:

As the representative of the medical profession of North Carolina, I have the honor and happiness to bring to you on this occasion an expression of its greeting, good will, and God-speed in this noble enterprise. Doctors are humanitarians, and as such, welcome an institution that has for its purpose the amelioration, cure and prevention of the ills that affect humanity. As North Carolinians, we are proud to have in our midst such a school of medicine, strategically located, scientifically constructed, and ably manned. We not only welcome its coming, but we also pledge in advance our professional sympathy and cooperation to the end that the dream of its benefactor may be fulfilled and the hopes of its executives realized.

North Carolina has great pride and joy in remembering that one of her own sons founded this institution. It is a new development, an expression of our own vitality and intelligence. While the whole State and all its agencies of enlightenment rejoice in this fresh flowering of our life, the devotees of our science of medicine may be allowed some distinction in the general happiness of this occasion. For what these agencies have already accomplished makes most opportune this important addition to our resources of training and service, and supplies a promising soil for the highest development of this great ministry.

In a remote corner of the State a friend has built a cabin which is all his own. It is sentinelled by long leaf pines and giant oaks, and when spring comes the dogwood and redbud make a garden spot of his retreat. For it *is* a retreat; there it is he goes when he is burdened by care, when, as an old negro servant expressed it, "his mind is overstocked." He can lie on the ground and feel the kind and understanding earth drawing his worries and grievances out of him. He goes there for inspiration also, for he can do his best planning and thinking there. And he comes away from his woodland haunt renewed in body and spirit, with a new vision of tomorrow's tasks.

You must forgive this seeming digression and the humble analogy of the cabin in the woods to Duke University's wonderful plant and broad acres. The truth is, I never come on this campus without being impressed by the wisdom and prophetic genius of those who selected this site for this great institution. They knew that this majestic wooded expanse would have its effect on those persons whose days would be spent here, whether the man at the fountain-head of knowledge, the student, the patient in the hospital, or the stranger who makes a reverent pilgrimage to these gates. The founders of Duke University knew that in a place like this nerves would be soothed and abilities quickened. On this campus, so recently borrowed from the unbroken forest, the mystery and magic of the woodland lingers and will linger. Here indeed the spirit can ask and receive.

It may seem trite to say that the age of miracles is not past, but these words will rise to my lips when I remember that a few years ago this place was a pine forest, and the beautiful stone which speaks so eloquently from these buildings was silent in a quarry. Yes, a miracle has been wrought—yesterday a forest, today a city set on a hill; yesterday a place of silence, unbroken save by the wind in the pines and the songs of the birds, today the Mecca of leaders in medical thought. Again I say we have seen a miracle.

We have waited for the coming of the Duke Medical School, but we have not waited in idleness. We find this day the culmination of a dream, the fitting and joyous climax of endeavor. We have sought to create an intellectual and scientific atmosphere in North Carolina in which such an institution as this may thrive, and it is our pride that we are ready to fall into step and march forward with this great new enterprise. If we all work together, is there any limit to what we can achieve? During past

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generations we have been, so to speak, cracking the great mother of the sciences, medicine, into smithereens (like petroleum in order to learn more about its component parts) making specialty after specialty. This was absolutely necessary in order to search out the inner secrets to the last remote hiding place. But we hope and believe that in this place, unfettered by tradition, unhampered by lack of resources, and with provision made in the most ideal way for intellectual and physical contacts, all under one roof, we may witness a reassembling of these now-understood parts into the original organism, medicine. In other words, we hope that analysis may be followed by synthesis. Have we not seen in the field of medicine the disjointing of the mythical jointed snake and is it not time now for us to view the spectacle of rejointing?

There is another task before us, a task and a privilege. We hope that in this mild Southern climate the ice-bound quality, the rigidity, of the science of Medicine may thaw a little, so that the patient himself who is afflicted may be considered as well as his disease. In other words, that the patients admitted to this hospital will be regarded as personalities and not merely as cases. In this way the austerity of science could be blended with the sympathetic art of medicine, with no compromise of either. Surely the heart is just as necessary as the mind in the great business of healing. And if ever a neighborhood were suited in all its phases for this dual task, this seems to be the chosen one.

You will pardon me if I lay special stress here on the greetings from the two-year medical schools of the State. In speaking for these institutions (which give the pre-medical courses and only the first two years of the medical course) allow me to say that we in no way consider that we are in competition with you. The roads we travel lie side by side, with many pleasant and mutually helpful convergences. All these roads lead ultimately to the same great and important destination, the well-being of humanity. Your road goes further than ours and climbs higher, but we are ready to cheer you on to the last mile. With such cooperation we feel that nothing but mutual good can result. We think the two-year school is sound theoretically and will continue indefinitely for two reasons:

(1) The high standards required for medical students react on the academic work most favorably. The premedical students set a high standard for other students because they have to do so. Moreover, the presence of medical students who are serious, hard workers, of maturer age, and who have frequently already obtained academic degrees, does much to stimulate academic undergraduates and give dignity and tone to campus life.

(2) It is commonly recognized that the drill work of the first two years of medicine can best be done where the group of students is small and the individuals brought into personal contact with the instructors. The fact that these instructors are selected for their capacity for this fundamental teaching makes for additional satisfactoriness to the extent that the great centers are relieved of this burden, they are the better able to occupy their most important field of clinical research.

Upon reading Lord Macauley's address upon his installation as Rector of Glasgow University in 1849, I am struck with the appropriateness to this occasion of one paragraph, which I shall read with necessary paraphrasing:

"There is no lack of alarmists, who will tell you that you are commencing under evil auspices. But from us, the medical profession of North Carolina, you must expect no such gloomy prognostications. We are too much used to them to be afraid of them. Ever since we began to make observations on the state of our country we have seen nothing but growth and we have been hearing of nothing but decay. The more we contemplate our noble institutions, the more convinced we are that they are sound at heart, that they have nothing of age but its dignity and that their strength is still the strength of youth. The hurricane that has recently overthrown so much that was great and that seemed durable, has only proved their solidity. (Might not this refer to our own financial depression!) They still stand, august and immovable. . . . I see no reason to doubt that, by the blessing of God on a wise and temperate policy, on a policy of which the principle is to preserve what is good by reforming in time what is evil, our civil institutions may be preserved unimpaired to a late posterity, and that under the shade of our civil institutions, our academical institutions may long continue to flourish. I trust, therefore, that when a hundred years have run out, this University will still continue to deserve well of our country and of mankind. I trust that after another century we may find the spirit of the institution the same, that the one who stands here in my place may boast that the hundred years have been glorious years, that he may be able to vindicate that boast by citing a long list of eminent men, great masters of experimental science, of ancient learning. He will, I hope, mention with high honor some of the young men who are now present; and he will, I also hope, be able to add that their talents and learning were not wasted on selfish or ignoble objects, but were employed to promote the physical and moral good of their species."

May I, in closing, remind you that there was in Jerusalem in the days of the Great Physician

a pool, Bethesda, meaning in the Hebrew "House of Mercy." It was a place of focalized pain, the five porches being crowded with the blind, the halt, and the withered. According to tradition, an angel came at certain intervals and "troubled the waters," impregnating them with curative power. This, of course, may only refer to intermittent springs whose waters were supposed to have medicinal value. I mention this traditional "Fountain of Miracles" because it may be said to have its modern counterpart in the Duke University Medical School. But this does not depend on magic or supernatural cures; it goes deeper than that. A God-given science furnishes the means, and science is indeed the wellspring by which the diseased body may be cleansed and made whole. From this School hundreds of angels of mercy will go forth to heal and prevent diseases that afflict the bodies and minds of men. These humane and philanthropic souls will help the Psalmist to fulfill his words:

"For with Thee is the fountain of life; and in thy light shall we see light."

THE TRANSFORMATION IN MEDICINE*

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Great industrial development so dominates the more civilized countries at present that the very age we live in is called "the industrial age." The changes in methods, in organization and in viewpoint that led to this have been so great that we speak of "the industrial revolution." It is, however, not only in industry that there has been a revolution. A similar transformation has occurred in many other lines of work and in none more than in medicine, which great field of work this University is now entering.

When fundamental changes in aims and methods are occurring in any form of human activity, there are, together with some disadvantages, certain great advantages for those who enter the field at a time when the direction and character of the changes have become somewhat advanced and in part defined. Those who have long been in a movement have accumulated equipment, as well as traditions and viewpoint, and these have to be greatly altered, and alterations are often more difficult than starting afresh.

It is common knowledge that in great varieties of ways scientific progress has in recent decades had a profound influence upon the lives and the activities of civilized people. In no way has this been more marked than in relation to the preservation of health and the understanding and treatment of disease. Indeed, we may, I think, say with confidence that in no other way has the progress of knowledge had a greater influence upon the happiness, the well-being, and the effectiveness of the average individual. But we may also state with much confidence, and this is of immediate interest upon this special occasion, that no professional group has had the character of its work and the guiding spirit of its work so greatly transformed as have those who practise medicine and public health, and hence in no profession has the character of training changed so much.

The lay public, as well as the profession, comment frequently upon the many and great changes that have occurred recently in medicine, but I venture to state that few even of medical men, unless they examine the facts in detail, realize adequately how very great the change is, how many of the items of their daily work have been altered or quite transformed and, most important of all, how largely the mental attitude of the doctor has perforce changed.

It is customary to speak of the quantitative effects of the change, the numbers of details, that is, that have been altered. The more interesting and important effect, but an effect that is less obvious, is that, as additions to knowledge and methods have accumulated in number, there have come extraordinary qualitative changes in the purposes and the viewpoint that guide the teaching and the practice of medicine, and with this, the private or institutional care of the sick.

Some illustrations of this are very obvious. A generation ago there was fair knowledge of the effects of disease as found after death, but there was little accurate knowledge of the precise influence of diseased alterations of the body upon actual functions of the body during life, and there was similarly very little accurate knowledge of the precise causes of disease, and necessarily consequent upon this there was very little knowledge of the methods of real preven-

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*Address delivered at the Dedicatory Exercises of Duke University School of Medicine and Duke Hospital, Durham, North Carolina, April 20, 1931, publication in the Southern Medical Journal financed by a grant of funds from Duke University School of Medicine.

tion of disease. Gradually new knowledge and new methods of study have taught us some of the effects of the structural changes upon the activity of the human machine while it is in operation and at the same time we have learned with precision the causes of some diseases and with this has come in some instances power to check existing disease and especially power to prevent disease. Each of these things is true in a far smaller proportion of the whole range of the doctor's duties than we wish might be the case, but the advance has gone far enough to bring with it a fundamental change in the conscious aims in view.

When I entered medicine, diagnostic skill really meant chiefly ability to designate accurately what would be found in the body if the patient died rather than what effect was actually being exerted by his disorder upon his life functions at the moment. As to prevention, we were so powerless in the vast majority of instances that hygiene meant for the most part quarantine of dangerously contagious disease, suitable plumbing installations, and the control of nuisances. The doctor's campaign at that time was largely a defensive one, and in hygiene it was in fact, though this was not realized then, in good part an anesthetic one. Now, while we are still far from being able to achieve our ends in most diseases, the trails have been in part blazed and many methods of further progress have been indicated. The intelligent physician thinks increasingly now of the functional effects of disease as the essential thing to be understood in diagnosis, while in hygiene the object has become the early arrest, or better, the entire prevention of disease, and in some cases the actual eradication of certain diseases. The aggressive view has largely displaced the defensive.

With all this, there has been a still more fundamental change in the mental atmosphere in which the doctor works. When I entered medicine, and for a considerable period after, the practice of medicine depended almost entirely upon the trained senses, especially sight, hearing, and touch, and the exercise of judgment, experience, and imagination in interpreting these results. In but few ways could the doctor obtain information that was accurately measurable, and in extremely few ways could he secure data that were absolutely definite. The impressions reached from a patient's story, or from tactile, auditory, or visual observations are ordinarily not precise, and used alone are often subject to error. Only if death occurred and there was an autopsy could it be actually determined whether many of our observations were correct, though in a few cases this could be told at operation. Furthermore, these methods usually indicate only somewhat general things that are likely to be common to a variety of disorders, and judgment or impression must be depended upon to determine what they do mean in an individual case. The ways in which these older methods can be relied upon, as well as their limitations, have become much clearer since it has become possible to reinforce and criticise them by methods that are measurable.

Anyone who is vain of his powers of observation and their accuracy can easily have his vanity shaken by such simple things as, for example, comparing his estimates of the extent of anemia, made from merely looking at patients, with accurate blood examinations in a series of cases. And yet in even such simple things, the doctor had rather recently no methods of checking up upon the reliability of his interpretations of his own senses. We were, for example, taught earnestly as students to estimate the tension of the pulse by feeling it. I have often, in later times with a group of able and highly trained physicians, had the individuals of the group estimate the blood pressure by touch, and then check it with a blood pressure apparatus, and have at times found the individual estimates to range 100 points wide of the actual blood pressure.

When I graduated in medicine, my roommate and I were, I think, the only students among the six or seven hundred then in the whole of that school who had ever counted blood or examined stained specimens of blood. We had, but only because we had by chance close personal relations with a young instructor who had become interested in these new methods that were just coming in and he kindly taught us. There were no methods then of measurement of blood pressure in patients, the x-ray was unknown, bacteriological methods were, to be sure, beginning to be known, but they were little understood and hence little used, and when used they were often employed most ineffectively or erroneously. Surgical antisepsis had, of course, been in use for some time and with great advantage, but that it was in its infancy is indicated by the pictures that I can still see of one of our Professors of Surgery operating day after day in the same unwashable cloth operating jacket, always the same jacket, and while he told

us to use antiseptic methods, it was difficult to see in what efficient ways he used them himself, while the other Professor of Surgery, who was already an ardent advocate of antisepsis, would regularly scrub his hands thoroughly and after that would reach into his trousers' pocket for his pocket-knife, scrape beneath his finger nails, replace the knife, and proceed to operate.

The diagnostic use of bacteriological methods was already possible in a few ways, but was little comprehended or employed. For instance, with that great disease, tuberculosis, ever about and in many cases suspected to be the cause of obscure symptoms, my able chiefs never once asked for an examination for tubercle bacilli during the whole time that I was a hospital intern, though that was already feasible. The same was true of all that host of other bacteriological examinations of the secretions and of the blood that are now often an essential part of the clinical study of a case. The treatment that has come through bacteriological research and the preventive measures, the serums, vaccines, and so forth, that are now so eminently important in some diseases, almost all these were unknown. All but a few animal parasites, and these mostly of minor importance, likewise were unknown to the clinician, or were not yet thought to be of practical importance. Hookworm, for instance that vast and widespread disease, was then believed to be of very slight consequence, and to most doctors merely a curious thing found chiefly in some European mines. The usual doctor, even in this part of the world, where it is now known to have such importance, considered it outside his sphere entirely. Its great rival, as to geographical extent and the numbers of people whose health it endangers or ruins, malaria, could be accurately diagnosed as the parasite could be demonstrated in the blood. But that such things were not a common part of the practice of medicine is shown by an experience during my internship when we had a patient who was thought perhaps to have an obscure malaria. Nobody in that well-known hospital had ever seen the malarial parasite, so we asked a man in the city, who was supposed to have had some expert experience in this, to examine the blood. He told us, and showed us, that there were large numbers of malarial parasites in the blood. A year or two later, when I learned something about malarial parasites and recalled the picture in the above blood, it was perfectly obvious that what our expert was showing us was the large numbers of stained nuclei of the normal white blood cells.

The Wassermann test for syphilis, now of such diagnostic and public health importance, was unknown, and I remember keenly the excitement, with dreadful numbers of cases of typhoid fever always around us, when the Widal test for typhoid came in and seemed likely to prove able to aid us greatly, as it has done, in the accurate diagnosis of the presence of that disease. We were wisely taught at that time that if we studied typhoid fever and its diverse complications thoroughly we would know most features of acute disease in general, but the prevention of that disease has since been so successful that if we depended upon it now to teach medicine doctors could not be trained in most of our communities. The diagnosis of what was then a greatly dreaded and terribly fatal disease for which there was no effective treatment, diphtheria, was still almost purely dependent upon observation and judgment. It was very common and the mortality sometimes ran to 50 and 60 per cent. It could not be controlled. At best some relief of symptoms could be offered. One of the most dramatic and affecting experiences that I have ever had was when I was working, a year after I had graduated, in Vienna and was daily going the rounds in the Children's Hospital, including the diphtheria wards. At that period diphtheria antitoxin came into use. We had seen in the same hospital wards a series of cases of diphtheria treated without antitoxin,and then the use of antitoxin began and we saw the marvelous difference. Old Professor Widerhofer, accustomed to the previous conditions all his life, day by day would stop amazed by the beds of children that a few hours before had been prostrate and dull and terribly ill, who were sitting up in bed, playing with toys and utterly transformed. His warm heart was always overwhelmed by the extraordinary change and he could only exclaim each day "Wunderbahr, meine Herren, Wunderbahr." The reduction since then in the deaths from diphtheria is one of the happiest stories in medicine.

The changes were often almost resented by some older conservative physicians. They tended to upset completely their long established conceptions. President Eliot told me very dramatically, with the astonishing memory he had of the details of conversations of even fifty years before, how bitterly a then very prominent children's doctor in the Faculty of Medicine in

Harvard opposed the establishment of the first laboratory of bacteriology and course in that subject under Dr. Harold Ernst, when the latter came back from Europe armed with some knowledge of this new subject. It was a new fancy notion that should not be encouraged in a serious course in medicine. But when the bacteriological diagnosis of diphtheria became possible, Dr. Ernst was the only man in that region who could make the diagnosis, and when the use of antitoxin came in he was the only man who could make and provide the antitoxin. President Eliot said that one day going into Dr. Ernst's laboratory he met the above mentioned pediatrist coming out of the laboratory and said to him, "Doctor, isn't this an extraordinary place for you to be?" Whereupon the doctor replied, "Yes, but nowadays you can't get your damned diagnosis anywhere else, and you can't get your damned treatment anywhere else."

It has always been the case, and probably always will be, that persons long accustomed to established methods in their life work will be greatly disturbed by very radical alterations of their methods and by very revolutionary alterations of their ideas. It is said, for instance, that when Harvey promulgated his discovery that the blood actually circulates, this revolutionary idea was so resented by his own profession that probably no one in medicine who had passed the age of forty ever forgave him. And yet it was, of course, as great a discovery, especially considering the circumstances of his time, 300 years ago, as has ever been made in medicine.

I might detail a multitude of other things, but I may epitomize by saying that the great array of exact methods which are now used constantly and which help the physician in many ways to check the accuracy of his observations in the general run of cases, which in some instances even permit him to make an absolute diagnosis and at times give him a definitely specific treatment, have almost all developed within the period that I have personally known medicine. I remember years ago attending a teaching clinic by Dr. Frederick Shattuck and hearing a student speak of some sign that he had obtained upon examining the patient, in his belief, a pathognomonic sign; a sign, that is, that definitely indicates a particular disease. Dr. Shattuck, in his characteristic wise and quizzical way which so often brought in a paraphrase of a Biblical quotation, replied, "A wicked and adulterous generation seeketh for a sign, but no pathognomonic sign shall be given them." I thought then how true that was. And yet in the interval since then a whole group of signs that are essentially pathognomonic have been given us through new methods of study. Let us have no misunderstanding as to what these methods do, and do not do. One of the reasons for a critical attitude on the part of older clinicians has been their feeling that the newer methods are considered to displace the older established methods and to lead to their being discarded. In point of fact, it is difficult to keep many students and younger members of the profession from taking something of that view themselves. It is tempting when a method is exact to believe that it is necessarily superior to, and should supplant, inexact methods, and the long established methods of inquiry and of physical examination of patients are at times neglected, less because of the teachers than because of the enthusiasm of youth, I think. They are not intended to displace them. The valuable old methods remain and will remain. They are as basic and essential to the examination of patients as an alphabet is to a written language and their value has been in no way lessened, but has been increased and made clearer in that we know better in what ways they are to be depended upon and in what ways they are likely to lead us into error. But there have been added many that were previously unknown and are of great value, and a striking feature of many of these is their greater exactness and measurableness.

With no thought of belittling the value of these new methods in what they accomplish of themselves, I would say that the most fundamental effect has been the altered atmosphere and viewpoint in clinical medicine that they have brought about. The doctor does things much more skillfully and with much more certainty than before, but this is not solely, indeed not chiefly, because he has a larger variety of tools to work with and because the accuracy of his tools has improved. It is chiefly, I think, because only a few years ago so little could be done in precise ways, so much depended upon the personal equation, that he was thrown back constantly upon speculation, and speculation tended to become habitual. When a consultant was called in, it was his opinion that was wanted. He rarely had any greatly differing methods of studying the patient, or much greater skill in them than a good practitioner. He had, or was believed to have, wiser judgment, more

information and experience, more intuition. Now enough things have become subject to more exact methods, and the beneficent effects of precision have become obvious enough to teach the doctor a distrust of mere opinion and especially of speculation, and his aim has become accuracy and demonstrability and the critical examination of his own and others' methods and interpretations. My friend, Professor Whitehead, said to me recently while driving in the country, that he believed the motor car had had an extraordinarily valuable educational effect upon the uneducated farmer in entirely altering his mental attitude and judgments, and explained this by saying that the farmer had always had two dominating things in his life that he could not control or work out in any accurate way: one, climatic changes which are beyond his powers of control; the other, disorders in animals. The latter, even more than human diseases, are very difficult to understand, even by trained persons, and they have throughout long tradition been conceived of and handled by most farmers largely on the basis of legend and superstition, with no method of determining that their ideas regarding them were right or were wrong. There was, for example, for years a widespread feeling among many farmers that a variety of disorders in cows are due to what they called "hollow horn" and the treatment used to be to bore a hole with a gimlet or other tool into the cow's horn, apparently to let the hollow out. The tenant farmer on a farm that has for a couple of hundred years been owned by my family, a fairly intelligent man and an excellent farmer, became convinced some years ago that a sick cow had "hollow horn," but dehorning of cattle had come in and this cow's horns had been removed. Having no horn to bore into, but the cow appearing to have "hollow horn," he proceeded to bore a hole into her skull with a gimlet. Whether the hollow escaped or not, the cow died of meningitis. The motor car has, said Whitehead, brought into the farmer's life a thing that has become essential to him and which, if out of order, he can with very little training investigate fairly accurately and often clearly demonstrate what is wrong and what should be done about it. This has quite altered his whole viewpoint regarding many things, from the speculative, superstitious one to a realistic, logical and objective one.

A change comparable at least to what has just been mentioned, though on a higher level, has occurred in the past few decades in medicine, and that change is, to medicine itself, the most influential and striking thing perhaps that has occurred. Is the viewpoint in the following incident, much more logical, even though it be more academic and apparently more rationalistic, than the superstitions of the farmer? A great German physician, Kussmaul, in his reminiscences which he calls "Jugenderinnerungen eines alten Aerztes," refers to the notebooks of his father, a doctor who was trained under Schoenlein, at the time the most distinguished clinician in Germany, a man of scientific training and, for the day, of scientific viewpoint, whose work is permanently recorded in medicine. The elder Kussmaul's notes on a lecture by Schoenlein are about as follows:

"Gentlemen, iron is the drug par excellence for diseases of the spleen, and if you will reflect a moment you will see why this must be so. It has long been known that mercury is the drug of choice in diseases of the liver. The liver is a large, firm organ on the right-hand side of the body; the spleen is a small, soft organ on the left-hand side of the body. Mercury is a light-colored, brilliant fluid metal; iron is a dark-colored, dull, solid metal. Obviously iron, then, is the drug of choice in diseases of the spleen."

That, to be sure, was one hundred years ago, but there were details that were comparable to this in the teaching that I had as a medical student, and the striking thing was that the mere opinion or reasoning of a distinguished person was often followed almost religiously by a large proportion of the profession. In treatment particularly, I could detail many things that were then considered either specific in certain diseases or at least the absolutely necessary treatment that have now been wholly discarded and in some instances have been shown to have been diametrically the wrong treatment. The spirit that was shown in a letter that I have seen, written by Benjamin Rush, the great man of his day more than one hundred years ago, to a physician with whom he had seen a patient in consultation and for whom he had obviously recommended bleeding, is not different in spirit from another incident that I shall mention immediately that occurred one hundred years later. The doctor had written Rush that the patient had died after the bleeding and that he thought bleeding had precipitated death. To this, Rush replied angrily that the whole trouble was that the doctor had not bled the patient enough. A few years ago a doctor friend of pediatrics in a prominent medical school saw an infant who was doing badly. This consultant

prescribed a certain milk mixture. The baby did not improve and the family doctor wrote asking him for further suggestions. The consultant replied, "Continue to use the milk mixture I ordered and the child must improve."

The great difference now is that a considerable number of things have become subject to accurate demonstration and criticism and that mere opinion has become of little moment unless re-enforced by accurate and logical data.

Those who have been but a few years in medicine, and especially those who are now entering medicine, have, of course, no way of realizing how different it is from a generation ago, except that they are told. They naturally accept medicine now for what it is now. Great changes will occur in the decades immediately to come, almost beyond doubt. They may readily be even greater than those that have occurred in the past generation. But however fascinating the progress of medicine may be in the years to come, it can, I think, never give quite the same sort of thrill that those of us who have seen the past few decades have had, for not only has there been the thrill of seeing enormously interesting and vastly beneficent things discovered and put into practice one after another, but there has been that change from the time when the physician working as earnestly and as conscientiously as possible worked nevertheless with a consciousness that in a painfully large portion of his tasks he trod in the dark without clear knowledge of how to go forward, especially in practical ways of controlling disease, and in treating it by specifically effective means. The light is dim still in very many ways, but some things and some pathways can now be clearly seen and the doctor knows now that blindness is not imposed upon him from generation to generation, but has confidence that things will be more and more visible from year to year. That change, I think, can occur but once. We have seen essentially the birth of a new medicine and things are born but once.

We owe this in nearly all ways to the devotion and brilliancy of a great group of workers in the laboratory and in the field in all parts of the world. The constant pressure upon, and the limitations of the life of the practitioner, while they allow him to perfect detail, make it impossible for him usually to contribute much himself that is fundamental. The bacteriologist, the pathologist, the physiologist, the biochemist, the hygienist, the clinical investigator, whose lives are devoted to that sort of work, contribute nearly all the deep, fundamental ideas and methods which are applied to the practice of medicine. Oftentimes their practical value seems distant, if there be any, and often it takes a painfully long time for them to reach practical utility. It is frequently said that a great scientific discovery is not made of general practical value on the average for perhaps a generation. But it is surprising to realize how rapidly many purely scientific discoveries have become of the utmost practical value within the past few years. It was almost no time after the photographic powers of the x-ray were discovered before it was demonstrating in the clinic things that could never be determined before. A pretty example of the rapidity with which a purely abstract study can lead to highly practical things is Dr. Cannon's work on the x-ray in relation to the digestive tract. It began with the desire to settle, for almost purely academic reasons, the question whether, in swallowing, the food is bolted from the throat down to the stomach with one thrust or whether the muscles of the gullet carry it by continous wave-like contraction down to the stomach. Cannon chose geese because their long necks would permit of better observation and he had them swallow buttons that would be shown by the x-ray. He soon settled his original point, but wished to make more accurate observations and used a substance that would pass more slowly and would adhere somewhat as it passed along, so as to give a better picture, choosing bismuth. The original interest was supplanted with great rapidity when he found promptly that he could see the shape, the motions and other features of the digestive organs in ways that had never been possible before. Very rapidly the obvious practical interest of this physiological study caused it to be transferred into the clinic, where it has become, of course, one of the most important aids in telling whether the digestive organs are organically normal or have one of a variety of important disorders, a point that often could not be determined at all before with any accuracy.

It is but natural that with this enormous change in the whole conception of medicine and with the great accumulation of new and more scientific types of knowledge necessary now in order to understand the practice of medicine that many persons, particularly older clinicians, should feel that the scientific aspect of medicine is exaggerated in the training of doctors. For years, the same comment has been made many

times by men distinguished in the profession. The gracious author of "Rab and His Friends" dwelt strongly upon this in one of his essays. Oliver Wendell Holmes, of course, emphasized the same fear and so have many others, and yet medicine has gone on since their time, becoming more scientific and requiring scientific training much beyond what they felt was already too much. It is quite possible to let the scientific training crowd out other essential aspects and I would not seem to belittle the empirical upon which we still must often lean, while the psychological aspects which we cannot yet study by precise methods must be emphasized more than has ever yet been done, even though they still depend chiefly upon observation and imagination and other inexact methods of study. But it is quite clear that a fundamental understanding of the elements of the basic and the medical sciences upon which much of medicine now absolutely depends is necessary to intelligent entrance into the practice of medicine, and also that the training in science should be such that the doctor of the present day, facing a probable advance in knowledge as great as, if not greater than, that which has occurred in the past few decades, must have training enough not only to comprehend what is now known, but also to judge somewhat critically the work that will appear in coming years in order that he may intelligently use or discard new observations, or he will rapidly become a fossilized product of what is now the best but may soon seem an old-fashioned type of medicine. The changes that have occurred have been vast, as indicated. Those that are to come are likely to be even greater and even more rapid for a time because such wide fields have been opened and such a multiplicity of attack has been devised. A generation or so ago the making of a great discovery indicated genius, and genius is rare. The methods now have been so greatly improved and multiplied that similarly important discoveries occur constantly, but they now seem to us due less to genius than to thorough training and use of what is known, and to devoted work. These are not rare. With many persons prepared to add to knowledge and with many methods available now, the speed of progress is likely to be much increased.

Among the changes that are beginning now and that are likely to occur still more largely in early years to come, there is one aspect of medicine that, while it is less thrilling than great discoveries that make profound alterations in the control of disease, is nevertheless likely to be extremely influential and to have an effect upon the character of the practice of medicine, and the character perhaps of the average doctor, as great as some of those things that I have mentioned.

The medical profession is almost unique in one highly important particular. In other professions, as in law, engineering, the ministry, and other forms of work, the individual members of the profession work more or less openly in public or in well developed organizations where they are subject in the details of their work to the knowledge of others, and the character of their work can be judged favorably or unfavorably upon evident grounds. They are likewise parts of more or less defined organizations—the church, the bar, construction companies, and the like.

The medical man, on the contrary, does his work from the time that he begins his professional practice in most cases alone and without critical knowledge on anyone's part of the details of it. Dealing with the most important things possible, with life and health and death, he is absolutely his own master and has only his conscience to guide him or check him. I have the strong impression that perhaps as a consequence of this the medical profession is more ill at ease in organized methods of work and under any general control than other professions. Perhaps it is because it has attracted an independent type of person, perhaps the experience itself makes them prefer and demand the independent method of work. Certainly it was, a generation ago, a very unusual thing for one in the medical profession to be willing to enter into any organized method of doing his work. When I graduated, few men went into the Army or Navy or Public Health Service, and when they did it was often somewhat reluctantly and chiefly because it provided a solid and dependable berth. Very few ever went into other forms of salaried positions, and then mainly because simply of the need of money and usually with the desire to get out of it as soon as possible. It was looked upon as almost unethical to accept any form of position that was what was called "contract practice." Slowly a considerable change has already occurred in this. The public services are, of course, highly respected now. Practice on salary in industries, once a thing that branded a man unfavorably and at times would rule him out of medical societies, has now become an important line of work and has a special portion of the American Medical

Association meetings devoted to it. And so it has progressed in various other ways and, in all, to the point where a noteworthy number of doctors are now working in defined salaried positions in organizations. In a great many countries a definite form of widespread health insurance, that involves more or less defined contract relations with a major proportion of the doctors in those countries, has developed, a system that is compulsory in 23 countries for all those people below a certain income and is gradually being extended in many of them to somewhat higher incomes. This has brought much opposition in a number of countries, continued opposition in some, but in some has been so far adjusted to the welfare of both the people and the profession that it is becoming highly acceptable to the profession. In some countries, notably in one, it has been administered with such strong organization and such purely business viewpoint that it is really to some degree threatening the quality and character of the men that will enter medicine, both because of the conditions under which they work and because of the fact that the insurance people will not take very young men, and there is a period after graduation until they reach acceptable age for the insurance work when the young medical graduates are almost without means of earning their livelihood. Furthermore, it threatens to have a serious effect upon progress because in the scientific centers the necessity for carrying out expert detailed work of consultative character has become so multiplied and pressing and requires so much paper work that the able young men doing investigative work in the clinics are becoming overwhelmed with the pure routine in relation to the insurance.

The above example is sufficient evidence of the need of caution and foresight in this matter. The subject has given rise to much discussion. What will come in this country to meet the situation is not predictable. It is certainly likely to differ from the conditions in foreign countries, but that some degree of organization will grow out of this is altogether probable, for back of it is a purpose that is both highly intelligent and highly humane, namely, to provide for all persons adequate medical care at a price that is not a serious hardship and to accomplish this, in part at least, by distributing costs rather than by having all the heavy costs fall at any time upon those unfortunate enough to have the illnesses during that period. It would be foolish to attempt to prophesy what will come in this country, but it is obvious that the future will be met more intelligently if met with the cooperation of the medical profession and the outcome is made as effective and as agreeable as possible to the working physician, rather than simply opposed and antagonized. Certainly it should be approached with the purpose of preventing any system that tends to destroy some of the most valued aspects of medicine, particularly the freedom of action of the doctor, his freedom of growth and development, and the freedom of choice between patient and doctor. It is altogether probable that the situation will be met at first in this country in a diversity of ways in the different areas of the country. Among the many disadvantages of multiple ways of doing things due to our states' rights system there is the great advantage of opportunity for localized experiments as against covering the whole country with a relatively untried new system. In America we have sometimes taken advantage of this opportunity to work out quite intelligently certain public problems by experimenting in different ways in different states and gradually developing uniformly a well tried scheme. That, I trust, is likely to be done in this case and it may well be done. One way in which the distribution of facilities and the distribution of costs of care has been increasingly carried out in this country with increasing effectiveness is a way in which the founder of this University was, of course, deeply interested. There is in this institution, in the association between this School and the great endowment for hospitalization in this State and its neighbor State, an extraordinary opportunity for the development of a fine experimental example of the medical care of the whole community that may well greatly influence the care of the sick and the training of a new generation of physicians throughout the country.

It cannot at any rate be doubted that great changes in the economic relations of medicine are at present in progress and that still greater changes will come. Finance and industry control our modern life and will for a long time to come without doubt, and finance and industry appear to have found out quite clearly that health is an important thing to them. Great numbers of people realized this only with the building of the Panama Canal and with the dramatic evidence that that gave as to what modern control of health can do in great undertakings that are powerful in both war and peace. There have been many other examples of it in

recent years. It is interesting to reflect that so far as I am aware the first great step in preventive medicine that was taken in relation to a definite disease, a step taken a hundred and fifty years ago and that even considerably preceded vaccination for smallpox, gave rise at once in the minds of a group of highly intelligent men to a recognition of its economic importance. I think that ability to control scurvy was the first large step in the specific control of disease, in that case, of course, a nutritional control. This was due to a Naval surgeon, James Lind, who saw and thought far more clearly than most men of his time. He showed the enormously beneficial effects of certain things, particularly of fruit juices and fresh vegetables, in the diet of the sailors under his care at the hospital at Haslar when they had scurvy, then a very common and terribly severe disease of which many died. Captain James Cook was intelligent enough to suspect the importance of this and when he made his celebrated trip around the world he put into practice the methods that Lind had used, with the result that in his three years' voyage he lost only one man from obviously preventable disease (including not only scurvy, but other diseases, the methods that Lind used being broader than the mere dietetic control of scurvy, and involving other factors that tend toward disease). Soon after Cook, Lord Anson, the Admiral of the British fleet, likewise went round the world, but scorned to pay attention to these methods. On his flagship, "The Centurion," out of a crew of just under six hundred men, he lost almost three hundred in only a nine months' voyage from preventable diseases. Had Cook had the same proportion of losses, he would by the end of his three years' journey have had only ghosts as a crew. I think comparatively few people realize that upon Captain Cook's return, when he was given membership in the Royal Society and the gold medal of the Society, it was done particularly with a clear recognition by the able men in that body of the profound importance of his observations regarding ship's hygiene upon the future of England's maritime commerce. But that observation stands alone for a long, long period, particularly in the clear recognition of the economic value of health. In recent years, however, the evidence of its value has so multiplied and the public recognition of it has been so great that one sees a variety of ways in which this is deeply penetrating the minds of those who control the great activities of the world. When, as has happened, some railroads have instituted in the communities along their lines in certain areas of our Southwest measures for the control of malaria because they recognized that the betterment of health bettered the activities of the region and thereby bettered the business of their railroads, we may well take it that a new consciousness of the economic value of health is arising.

That great disease, malaria, presents other examples of the intimate relation between precise science and economic interests. The entomologists have demonstrated the peculiar fondness for impounded waters of the special variety of mosquito that in this country carries malaria, and this has led to legal regulations concerning the impounding of water that are directed toward the prevention of malaria. The expense of these, and the desire to reduce costs, led on to very interesting developments in mosquito control. This matter is of immediate concern in this general region and if I mistake not gives this University itself a direct interest in both the humane and the economic aspects of it.

Economic relations come up frequently now in seeking the control of certain diseases and even their prevention and in ways that would have been unthought of but a few years ago. In the great Mississippi flood of 1927, widespread and effectual measures were instituted for the control of an expected epidemic of infectious disease with profoundly striking results, infectious disease actually decreasing instead of increasing. The unexpected and surprising difficulty that was met was an outbreak of pellagra, a nutritional disease, not an infectious one. Investigation made it appear probable that this was due to economic conditions that would scarcely have been thought of only a few years ago in searching for the cause. The cotton crop had been poor for some years and most of the people in that region were dependent upon the cotton crop and consequently a large proportion of the inhabitants of that area, in order to get cash, had sold off things that could be turned into cash, largely chickens, eggs, milk, and the like, things in other words that are, against pellagra, the important normal protective parts of the diet. The people had thus become apparently sub-pellagrous and when the disaster precipitated upon them such conditions that only an artificial diet that tended toward pellagra could be provided them, pellagra broke forth in epidemic form.

When it became evident years ago that throughout vast areas of the South pellagra was very common, it was often said that it must all

have been there before and been overlooked. To any one who has investigated the conditions in the areas where pellagra has been common, this seems a poor explanation, unless the medical profession is much less intelligent in recognizing disease than we hope. It seems more probable that one important factor at least was the condition that New England is now suffering from, namely, that cotton mills have been moved from New England to the South and right in the cotton fields not only were there mills constructed, but new villages and towns, and the poorer people of the neighborhood who had previously lived on the land, and while they had lived poorly had had normal forms of food, had been collected into villages where their diet had to be obtained largely from things that were imported in bulk and provided by the company store.

Again, many further illustrations of this point could be brought forward. The disease beri beri, so important in wide areas of the world, is, of course, dependent upon peculiarities of diet, and these in large part depend upon economic conditions. When I was in Peking, I found beri beri not uncommon, but the hospital staff had shown that it occurred there chiefly in poor students from other portions of China who were accustomed to very different elements in their diet, and, being unable to pay for things unusual in Peking, and not liking the food that they were not accustomed to, eliminated much of the latter from their diet and thereby unconsciously put themselves on a diet tending to produce beri beri.

In a great area of China, that extraordinary disease, osteomalacia, is astonishingly common. Here again it is with little doubt due to peculiarities of diet imposed upon the people in that area in part by great poverty and not improbably in part by defects in the soil, such as Arnold Theiler demonstrated to be the cause of certain bone disorders in cattle and horses in South Africa.

The invasion of big business into Porto Rico has been coincident with nutritional defects in large numbers of the people of that island, which while not yet clearly studied, appear to be probably due to two things: the extension of the growth of sugar cane until it has swamped the gardens that the people once had, and on the other hand accustoming the people to manufactured foods that can be bought in bulk and provided cheaply.

I would not multiply to the point of wearying you illustrations of the increasing recognition of the economic relations of health, but I would cite one more type of instance. Many of the great and successful industries of the country now recognize that in the control of specific health hazards and in the maintenance of more general health conditions of the industry, it pays to have a trained force and a costly system to care for their employees. They are coming also to recognize somewhat more subtle things. The head of a great corporation in this country has told me that they could have saved hundreds of thousands of dollars in what had subsequently been demonstrated to be necessary if, at the time that one of their large plants was built, it had been constructed under the supervision of an engineer who knew the elements of hygiene. It has become manifest that road engineers may either cause or prevent malaria in accordance with their methods of construction. Similarly I have seen instances where the effectiveness of an industry was greatly hampered and much unrest and disturbance occurred amongst the employees because the engineer who designed essential machinery set the pace of the machinery, as is usually done, from the standpoint of production and without due consideration of the physiological powers of the human individuals who attended the machines. Such things have apparently entered the consciousness of a few employers sufficiently to make it seem wise actually to develop some engineers with a special training in hygiene, an entirely new sort of profession. And at the desire of our Engineering School, our School of Public Health is conducting training for engineers throughout about a year's time that leads to a master's degree in engineering.

The picture is now such that it is difficult to escape the conviction that this economic aspect of medicine will influence more and more intimately for a considerable period to come many of the relations of the physician, and that careful, systematic study of the relation between medicine and economics, instead of the casual observation of its importance that has mostly been the case up to the present, is highly desirable for the future of medicine itself and may lead to certain additions to, or alterations in, the training of the physician, at least of certain considerable groups of them. We have long since recognized that the progress of medicine demands not simply men with medical training, but the aid likewise of the biologist, the chem-

ist, the physicist, and, also in more recent times, combinations of these like the bio-physicist, and experts in special aspects of these subjects, such as the physical chemist, the entomologist, the parasitologist. It begins to be highly probable that we shall now need very intimate association with, and aid from, the economist and that, as soon as forceful methods of studying our interests in that field are developed, we shall need the aid of expert sociologists. Certainly while it may be religiously hoped that the personal relations between the doctor and the patient will not be greatly altered in the care of sick individuals, it is evident that whereas until comparatively recent years the practising physician led an almost cloistered life doing his work in the quiet and seclusion of the sick room rather than in public, he now clearly has pressing public relations that bring a large part of his life into important public contacts, and whether he wishes it or not he will of necessity in future have closer relations with organized activities. This University, starting with the training of physicians closely associated from the beginning with a great and beneficent system of providing modern medical care for all the neighboring communities, is in an admirable position to contribute powerfully to thoughtful and intelligent progress in the services that medicine will render in future.

HOSPITALIZATION*

By WATSON S. RANKIN, M.D.,
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President Few, Distinguished Guests and Friends:

Because one man lived and thought and planned, we are gathered here in this castle of his dreams where ever resides his brooding spirit. Let us go back and endeavor to share his thoughts, see as he saw, and draw our inspiration from his great purpose: A country boy following the furrow, a youth peddling tobacco from a covered wagon, a lonely young man submerged among the millions of the metropolis, a captain of industry emerging from the mass, a strong man standing firmly amid the treacherous cross currents of commerce, a giant wrestling with the river, and then, full stature, maturity, autumn, with its mellowing reflections, his father and his father's ideals and that lengthening of the days vouchsafed to him who honors father and mother, lengthening days through the integration of his life with that of aged ministers, with that of childhood bereft of parents, with that of hundreds of thousands of helpless sick, with that of this great University, destined to play an important role in the history of our State and country.

It is written that everything is beautiful in its place, that is, when seen in all of its relationships. There is fascinating harmony in seeing the picture not in part but in the blended beauty of the whole. Where others have seen fractionally and provided some part of healing machinery, a clinic, or an important department of a large hospital, or even a large hospital, or a medical school, James Buchanan Duke, in the largeness of his vision and out of the abundance of his heart, saw and provided for a whole system of healing, complete in the articulation of its several parts. Thus seeing, he saw the hospital not as a thing in itself and by itself, but in its proper relation to the whole broad problem of modern medical care for both the many within its walls and for the multitude within the shadow of its healing influence; and seeing yet further, he saw the hospital not only in its relation to the whole community, but in its relation to other hospitals, saw the many hospitals which he would help to build and maintain, not as separate entities, but as a system of related, kindred, mutually helpful institutions.

Permit me now to speak briefly of these two relations of the hospital: first, the relation of the hospital to the community, and next, the relation of the hospital to other hospitals.

THE RELATION OF THE HOSPITAL TO THE COMMUNITY

A hospital is related to a community in three important respects: (1) It increases the quantity of medical service; (2) it improves the quality of medical service; (3) it provides for the poor.

A hospital increases the quantity of medical service available to a community in three ways: (1) It serves to retain in the community the older, more ambitious physician who has kept abreast of the advances of his profession and

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*Address delivered at the Dedicatory Exercises of Duke University School of Medicine and Duke Hospital, Durham, North Carolina, April 20, 1931, publication in the Southern Medical Journal financed by a grant of funds from Duke University School of Medicine.

who, without the facilities of a local hospital, is under constant temptation to remove to a community where hospital facilities are available; (2) it holds out to the more recent graduates of medicine, 90 per cent of whom have had one or more years in hospital practice and who have come to feel more or less dependent upon hospital facilities, strong inducements to locate in the community; (3) it still further increases the quantity of medical service available to a community by greatly enlarging the professional capacities of the physicians engaged in local practice. A physician whose services are in great demand, especially for the treatment of the more seriously ill, can examine and treat in a hospital, where he is assisted by nurses and technicians, many patients in the same time which would be required for him to reach and examine, unassisted, one patient on the outside. At Banner Elk, North Carolina, in a mountain section, sparsely settled, where travel is comparatively difficult, especially in the snows of winter, there is a 25-bed hospital, with two physicians, eleven nurses and one technician. These two physicians, with the hospital facilities and the assistance of its nurses and technician, are able to do, and to do far better, what would require the services of from six to eight physicians without hospital facilities and professional assistance. Last year this little hospital treated approximately 1,000 patients and provided treatment in its out-patient service for more than 6,000 visits.

A local community hospital, then, adds to the quantity of medical service available to a community (1) in retaining the better type of older physicians in the community, (2) in attracting the more recent graduates of medicine to the community, and (3) in doubling, trebling or multiplying by an even larger factor the professional capacity of the physicians practising in the community.

A hospital improves the quality of medical service available to a community in the following ways:

First, it holds and attracts the more ambitious and progressive type of physician to the community. It influences, as I have already pointed out, the distribution of physicians quantitatively, but what is far more important, it influences their distribution qualitatively. It is the better type of physician who is retained in and attracted to the community by a local hospital.

Secondly, it supplies to all the physicians practising in the community those facilities for taking care of local emergencies, surgical and obstetrical conditions, and provides them further with those diagnostic services, the laboratory and x-ray, without which it is impossible to practise modern medicine.

Thirdly, in the organization of its staff, the hospital supplies for a whole county a court of professional appeal for all cases of questionable diagnosis and treatment, and the very existence of such a professional court and the constant possibility of appeal has a far-reaching inhibition on carelessness in the general practice of medicine.

Fourthly, through an organized staff, the work of the individual physicians, especially their fatalities and infections, becomes a matter of professional responsibility, supervision and review. Time will not permit me to develop this thought. I will only ask you to reflect for a moment upon the difference in the relation between patient and physician when the patient is seen in the private office or home, and the relation between patient and physician when the patient is seen in a hospital, organized as it should be with the medical attendant a member of a professional staff and with his work under its constant supervision. In the one case, anything might happen and there is no review; in the other case, if anything serious does happen, there is assumed professional responsibility and review. In one case, the physician works alone, unchecked; in the other case, he works under the eye of his profession, open alike to its commendation or criticism.

A community hospital provides for the poor. Approximately 30 per cent of the patients in hospitals of the United States are full charity cases; 20 per cent are part charity cases, and 50 per cent are full pay cases. Forty per cent of the days of care rendered by the hospitals of the United States are free days. "The poor ye have always with you," and, judging from the amount of charity carried by the hospitals of the various sections of the country, the poor ye have everywhere with you.

The poor, scattered over our rural country, cannot expect the better type of physician, men who are busy and whose time is limited, to make long drives over rural roads to give them free service. They must be served, if served at all, in a limited way and by physicians who have time for rural practice, for long drives, physicians who are least in demand. All this the hospital mends. The poor are assembled under most favorable conditions for their restoration to health and adequate medical service from the best of the physicians of the community is made available to them.

In this conception of the relation of the hospital to the community, we see the hospital not as an entity but as an essential part of a complete medical service, a complete medical service which may be conceived of as a tripod, the three legs of which are (1) hospital facilities, (2) professional assistance, nurses and technicians, and (3) medical personnel or doctors. The hospital supplies in itself two legs of this tripod, facilities and nurses, and serves as the means for obtaining the other. In this way the hospital affords not only a place where the seriously ill are assembled and treated, but it becomes the means for building up a complete medical service that reaches to the remotest corners of the county.

THE RELATION OF HOSPITALS TO ONE ANOTHER

The more obvious physical relations between hospitals, such as the number of hospitals and hospital beds for a given population group, and the proper distances between hospitals, will be passed over with this brief reference.

There are less obvious but more important functional relations which should be noted here with greater emphasis and which in the future should begin to receive careful attention and every encouragement. It is not difficult to conceive of many avenues that lie open to this great central hospital for making itself most useful to other hospitals, nor is it difficult to imagine the opportunities for service within easy reach of our larger hospitals, which we may conceive of as district hospitals, such as the Highsmith Hospital at Fayetteville, the McLeod Infirmary at Florence, the James Walker Memorial Hospital at Wilmington, and others, to the smaller neighboring county hospitals, more elemental in their equipment and in the specialization of their professional staffs. Moreover, it is inconceivable to think that service rendered by the larger to the smaller hospitals will not be reciprocated in referred work. Kindness does not move in a straight line, but in an orbit, and sooner or later returns to its starting point.

With that breadth of vision of him who made our work possible and who saw the hospitals of the Carolinas not as scattered, separate units, but related in a great system of healing, we look forward to the time when the participating hospitals of The Duke Endowment will be articulated in a service of mutual helpfulness.

A REPORT OF PROGRESS

Much remains to be done to bring us to a full realization of his great conception; nevertheless, a good start has been made.

In 1925, 52 hospitals of the Carolinas participated in the work of The Duke Endowment; in 1930, 103 hospitals participated in the work of The Duke Endowment. In 1925, The Duke Endowment contributed to hospitals that included 41 per cent of the hospital bed capacity of the Carolinas; in 1930, the hospitals assisted represented 62 per cent of the hospital bed capacity of the Carolinas.

Hospital provisions for charity have increased in free bed day work from 216,781 days in 1925 to 339,127 days in 1926, to 434,361 days in 1927, to 518,999 days in 1928, to 612,318 days in 1929, to 718,667 days in 1930.

The growing interest and larger participation of the people of the Carolinas in providing hospital care for those who need it and cannot themselves obtain it is evidenced in the fact that the 43 hospitals which have participated in the work of the Hospital Section continuously for the last six years increased their charity days from 208,550 in 1925 to 462,000 days in 1930, an increase of 122 per cent.

In these figures we see the force and the effect of the example of our great leader, who, like Moses, standing on the heights and looking toward the Promised Land which he was not privileged to enter in the flesh, saw beyond the reaches of the retina, in the images of his thought, a better and a more beautiful world for those who should follow him. Toward that larger and brighter future, O absent one, we move on in your own simple faith, hoping, believing that from on high your eyes behold and your spirit guides.

EXPERIMENTATION IN MEDICAL EDUCATION*

By LEWIS H. WEED, M.D.,
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An occasion such as this, when we are gathered officially and formally to dedicate an important philanthropic and educational enterprise, seems to be more than merely an opportunity to felicitate the mother university and the community upon a definite achievement. This gathering marks more than the completion of a great building program; it records the launching of a new undertaking, providing new opportunities and new facilities for educational advance. The primary object of such a grouping of medical institutions as now have been completed by Duke University is of course educational, when viewed from the narrow standpoint of Duke University as an institution of higher learning; but with its hospital under the control of its medical faculty, Duke University offers in this new series of buildings a great humanitarian service to the community. Such intimate association of a medical school with a university hospital has repeatedly demonstrated its effectiveness in providing the best possible care of patients: the clinical teachers of all medical schools realize that their first obligation is the welfare of the patient in hospital bed or in dispensary. Yet fused with this duty of clinical care is the problem of education in medicine. To this topic I shall devote myself.

It is trite to talk of education as a general process of civilization, for it is recognized that educational practices begin even before the child is admitted to school; and they should, if conditions are quite favorable, extend throughout adult life in one form or another. As one analyzes present day educational tendencies, one finds that throughout the various groups of institutions there exists at least one phenomenon in common. One encounters in primary and secondary schools trial methods, where the child is allowed to work under various systems of instruction, upon subjects which arouse his interest. In some of the more advanced or radical schools, formal instruction is largely done away with; in other more conservative schools, instruction proceeds along definite and controlled lines of formal pedagogy. In the public schools of this grade, where universal education is considered a community obligation, it is not surprising that teaching methods should become largely standardized.

In the higher schools, the colleges, divergence of educational methods may also be noted. Here in recent years, certain institutions have devoted themselves to instruction of college students on a tutorial basis; in other places, so-called "honors courses" have been arranged for students of the last two years. Elsewhere, by establishing house units, attempts are being made to create wider intellectual interests by closer contact with students of other classes and with instructors living within these units. In still other institutions the instructional procedures are much more conservative and are almost standardized in content of courses and mode of teaching. Yet with the almost universal development of an elective system, whether it be liberal or rigid, the student is allowed some individual choice in his four-year college curriculum.

In the graduate schools of universities, there exists a certain lack of uniformity in academic conduct though the general methods are identical. In the majority of American graduate schools, by the system of majors and minors, there is an insistence on every candidate's meeting definite requirements for a degree. It is the exception, rather than the rule, to find true liberality of graduate instruction. Universities are, however, constantly altering in minor ways the methods of graduate teaching and are constantly trying to improve the quality of the product. The problem here is one of departmental instruction rather than one of broad general training; the student, theoretically at least, comes intimately into contact with the frontiers of knowledge. The true graduate school, in distinction to the vocational training schools, should afford real academic discipline in research, and any trial method of teaching should be aimed at the development of the individual rather than of large groups.

In all of these various phases of present day education, dissatisfaction with current teaching procedures seems a phenomenon in common. This dissatisfaction finds expression in the lower schools in the search for methods of instruction which shall arouse and hold the child's interest;

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in the colleges, by similar efforts to widen the intellectual horizon of students; and in the graduate schools, by attempts to develop students as individuals rather than as stereotyped, standardized products. Underlying this discontent is the realization that standardized mediocrity is the product of any standardized process of education: the student should be allowed a peculiar individual development for the highest intellectual attainments.

With acknowledgment of this dissatisfaction, there is associated almost everywhere a willingness to employ the experimental method, the "trial and error" method, in pedagogical efforts. Education may be looked upon broadly as a biological process, as a process which deals with the life activities of a group of individuals. In this sense, should not educational procedures be subjected to the same type of experimentation as other biological processes, in order that the intellectual development of the individual should be aided and not restricted by the educational program?

While almost every thoughtful person would agree to the use of an experimental plan in education, the difficulty of establishing the proper controls for the biological experiment confronts one with insistence. In most fields of experimentation with living subjects the controls are at best not wholly adequate, so that it is difficult to determine the value of the new endeavor. In the simplest of biological experiments it has been found possible to set up dependable controls, but when one deals with human processes, particularly in their social implications, the limitations of control become very great indeed. In educational procedures, as in other complex human processes, the controls will probably never be wholly satisfactory. Perhaps, in some future age, the biometrician, with a mounting fund of statistical methods, may by random sampling select comparable groups of students to be subjected to the same educational processes, under such conditions that he may be able to tell us exactly the effect, beneficial or detrimental, which the trial methods have had on the intellectual development of the individuals in the groups. But today the yardstick measuring the results of educational endeavors is not adequate for its critical task: one always feels that control is lacking in some essential way.

The limitations of any measuring rod lie primarily in the difficulty of determination of educational values and results. No two institutions ever have identical aims or attract exactly the same group of students, either in intellectual capacity or physical vigor. No two classes in the same institution will ever be quite the same; the environment, mental and physical, will vary as will the individuals. In spite of all of these difficulties of proper and adequate control, universities, colleges and schools are employing the experimental method as the one promising hope of ultimate improvement of the processes of instruction. It is interesting that mature students very keenly appreciate the opportunity to become part of a trial group in such educational experiments. This willingness on the part of students seems an expression of understanding that the institutions are employing the only weapon fashioned for the attack; it is evidence that current dissatisfaction with conventional methods of instruction has spread from faculty to student.

It must be quite clear to all educators that discontent with educational results has always been, and will, I hope, always be, a phenomenon of university life. But this discontent, this dissatisfaction, shows itself in cycles, in great recurring waves; at the moment the storm of dissatisfaction is almost at a peak. It will, of course, largely subside, to lie quiescent for an interval, and then burst forth again in some new way. Without these periodic storms, education would become fixed, inelastic, static; the periods of stress are those in which improvements are effected.

It is not strange, in view of this present cycle of dissatisfaction with the results of educational programs that in medical schools a similar discontent should be reflected. The primary aim of all medical schools is the same, the production of the best possible physicians, but the training must be of a professional character and not of a trade or vocational nature. Professional schools, especially in medicine and law, are subjected to limitations which do not affect the true graduate schools of universities; they must train their students to meet the minimal requirements established by the various state licensing boards. In itself this limitation would seem to remove from medical faculties the opportunity of conducting their schools with the utmost freedom of academic method, but the licensing boards view their task with the greatest breadth. The main duty of medical schools, the training of physicians, in itself imposes restrictions on educational procedure; this duty is expressed in the courses of required instruction as well as in the general attitude of the medical

faculty. The present disturbed state of mind regarding the conduct of medical teaching is not a new reaction; in periodic fashion it has recurred, as in other educational branches, during the forty years of modern medical education in America. Taking the required curricula as expressions of the medical teachers' viewpoint toward teaching, these four decades tell an interesting story of changing attempts to meet this primary duty of medical schools.

The eighteen-nineties for the first time saw American schools of medicine as integral, rather than remote, parts of universities, with full-time instructors in the preclinical subjects and with a university point of view. This university point of view may be summarized as one in which research is looked upon as an opportunity, as a function of every instructor. In such a school, a teacher must consider his phase of medical instruction not as a finished subject to be presented by didactic methods, but as one constantly advancing; in this advance the teacher must be a participant, if only in a very small way. This attitude of investigation is essential for the establishment of medical education on a true academic basis: research and teaching are indissolubly blended.

In the beginning of this period of modern medical education in America, the practice of medicine was founded almost solely upon pathology, and the medical specialties, as we know them today, were largely undeveloped. The first decade of the present century saw the utilization of chemistry and physics in medical diagnosis and therapy. With the ensuing enlargement of the field of medical practice, an increasing fund of information was available in all departments of medical learning. The result of this widened scope of knowledge, as it found expression in medical education, was an increased number of required subjects and of required hours in the four-year course. The obligatory work, demanded of every medical student, mounted year by year, until at the end of the World War the schedules of instruction were over-crowded by required courses, too many in number and too extensive in content.

The last decade in most American schools has fortunately been characterized by a swing toward a greater freedom of instructional methods and a decrease in obligatory teaching. Standardization of courses, ideal curricula, required number of hours, arrangement of courses, correlation of courses, these had been guiding topics of medical school administration; but in large measure all these have lost their importance as natural and desirable practices. Today in the better schools the emphasis is on student liberty and on the teacher-pupil relationship in small instructional groups.

All of these changes in attitude toward the processes of medical instruction are, I take it, but signs of a discontent with the results of the teaching efforts. More and more are medical faculties deliberately undertaking to rearrange the required curriculum in the hope that some other distribution of courses, or regulation of the extent of courses, may result in an improvement of the product. Such attempts are merely the application within medical faculties of the same experimental method which is today being so widely heralded for the pre-collegiate and collegiate years. Perhaps it means only that medical faculties are attempting, with new alignments and with new tools, to acquaint changing bodies of students with an increased fund of information; perhaps it is merely a desire to try to do the same thing in a new and different way. In any event the application of the experimental method to medical education results in a wholly desirable thing, a lack of standardization of medical schools and of medical curricula. For with such experimental tendencies in teaching it is inevitable that medical schools should develop along different lines of medical interest, responding in diverse manners to general needs and making the most of their own peculiar local opportunities. Without this tendency towards experimentation, teaching methods in American medical schools would soon become fixed, rigid and standardized; and no progress in professional education would be attained.

Medical education at best is an expensive process: it bids fair, with the increasing scope of each fundamental department in preclinical and clinical instruction, to become even more expensive. Taken in conjunction with hospitalization and the problem of "free" care of patients, medical education will demand even greater sums. But none of this high cost of medical education can be properly charged to the process of experimentation.

This problem of cost is an ever-present one which promises to become the most pressing of all of the problems of a medical school. I need not in any way attempt to justify these increasing costs, for it is obvious to any trained

observer that medical schools in general are hampered in their activities by lack of funds; and like all educational institutions it is likely that this hampering will continue throughout the future. Universities will always find themselves confronted by the necessity of conducting medical courses in the best possible fashion under the limitations of the facilities of the institution, the abilities of the faculty, and the funds available.

These limiting factors necessarily greatly modify the methods employed by medical faculties in meeting their primary purpose of training physicians. It is ofttimes argued that while all medical schools accept this function of training practitioners of medicine as their first duty, some schools emphasize far more the scientific aspects of medicine and others the practical clinical side. The inference to be drawn from this apparent separation of medical schools into two groups is that the teaching procedures differ necessarily for the two types of training. I cannot bring myself to agree to such an inference. It is quite apparent that the faculty of a medical school can devote itself largely to the teaching of the practical aspects of medical practice, but even here the emphasis must be laid upon the fundamental study of disease. Medical teaching must provide a basis upon which the student and practitioner can build: it is far more important to build in the students' mind a method of study, a point of view, than to force him to acquire so-called facts. Any system of medical teaching which lays its emphasis on the acquirement of facts rather than on the attitude of mind is, on critical analysis, found to be based on the conception that medicine and medical practice are static, unchanging, whereas medicine and the practice of medicine change even from day to day. In any well planned medical course, full weight must be given to the rapidly changing conditions and viewpoints of medicine: instruction must be given in such a way that the student leaves the institution with foundation-concepts which will serve throughout his whole life.

These concepts seem to me to be the same guiding motives in medical instruction whether in preclinical or clinical department. The subject matter is presented in such a way that the student is confronted with the basic data of the field; he is given a method of study, a particular technic, whether in laboratory or hospital ward. With these instruments of investigation the student is guided in his acquirement of information; he learns to make trustworthy observations. This view may be considered the expression of a preclinical rather than a clinical attitude regarding teaching of progressing medicine; but I do not believe that these two viewpoints differ at all. That there is a difference in emphasis may perhaps be true, but that is a minor divergence.

I think that most intelligent teachers in medical schools accept certain basic tenets on which to formulate their teaching, whether clinical or preclinical, whether for so-called scientific medicine or for so-called practical work. It will perchance be of profit to inquire briefly just what these guiding principles in medical education are and how they affect the processes of medical instruction.

As I have said elsewhere,* one of the most important of these principles is that the student in medicine should be subjected to influences which tend to arouse his spirit of inquiry and not to day-long attendance in didactic courses. Such influences look to the immediate or ultimate excitation of scientific curiosity in the student, so that throughout life he will look upon every task, upon every patient, as a problem for study and investigation. For these investigations certain technic must be taught, but the student really must be led to acquire a dominating zeal, an avidity, for scientific inquiry. The arousing of this spirit in the students constitutes a splendid opportunity for medical instructors: it is inspirational teaching at its best.

Another guiding tenet of medical education involves acceptance of the idea that for greatest individual development, the student must be granted utmost freedom in choice of work, the required courses being limited to the minimum and the optional work being as free as possible. Under these circumstances, the required teaching should not be spread over too many courses; what instruction is given should be given as well as possible and with full realization of the changing character of medicine. The critically minded medical teacher soon learns that his function is more that of a guiding agent than that of a pedagogue. The instructor affords the student opportunity to learn under the best possible conditions; but he really is not teaching, rather is he encouraging self-education. Such

*Some Tenets of Medical Education. Bull. Johns Hopkins Hosp., 45:203, 1929.

an interpretation of the medical teacher's function may seem somewhat restricted, but actually it affords the widest opportunities for intellectual service.

If one were to look upon the arrangement of courses in medical institutions from the standpoint of these principles in medical education, one would conclude that almost any schedule devised on a system of liberal self-education for the medical student would be in the nature of an experimental program; and so of course it is. But can any one in education, and particularly in professional education, judge or predict the result of an educational requirement or of a definite educational set-up? Here again the yardstick which will accurately measure the results in an advancing field of learning is lacking; here again we are forced to rely upon impressions and convictions rather than unassailable findings.

But how, then, are we to conduct the medical school at the present time if the measure of the product cannot be accurately determined? The answer is difficult, due largely to the fact that medical education must reflect, and must respond to, the changing conditions of medicine. To meet the increasing complexities of modern medicine, medical faculties must constantly revise their curricula; and in the process of revision experimental procedures are necessarily inserted. On the whole, the experimental process is beneficial; and the data obtained, while lacking exact control, still have some value.

Duke University has established its medical school at a time and at a cycle phase when medical educators are opposed to standardization of the four-year course and are content to allow schools latitude of individual development. It is an ideal time to try an experiment. I consider it very fortunate indeed that the initiating faculty here at Duke University School of Medicine should undertake a definite experiment, a wholly novel experiment, in medical education, based on certain premises which are debatable, yet which promise much. As I understand it, Duke University proposes first to lower the all-too-great age of medical graduates by requiring only two years of college education, laying emphasis on intelligence and character and on the quality of the courses in chemistry, physics and biology. Then, instead of conducting the course over four years of thirty-three academic weeks each, Duke University offers a continuous year-long process of instruction with a most liberal elective system, so that the student may in three calendar years obtain credit for four terms of thirty-three weeks' duration. Here is the saving of an entire year by elimination of the long summer vacations which characterize most other medical schools; it presents therefore a stimulating experiment in professional education. Will the student in this process of almost continuous medical work emerge from the school with as good a comprehension of modern medicine as would be afforded by four years with long vacation periods, during which a certain amount of settling-out and assimilation of medical knowledge might be assumed to take place? It will prove interesting indeed to evaluate the benefits and detriments of such continuous educational influences.

It is argued in the catalogue of Duke University Medical School that it is far better for the student to put in additional years of medical tutelage as intern and assistant than to spend them as undergraduate student. In other words, the shortening of the medical course is of advantage if the student will remain in the institution for a year or more after graduation. Whether this contention is true or not the future will tell. The students will possibly lack a maturity which graduates of other schools will have in years and mental ability; to compensate for this lack of maturity, the Duke graduates should have a somewhat greater youthful enthusiasm. And will students under these new conditions be able to acquire the cultural background in medicine which has always distinguished the greatest physicians? The medical faculty here has an opportunity to cultivate this humanistic side of medicine in a group of young and enthusiastic students.

All in all, it is a splendid thing that Duke University in its Medical School should embark on a novel and liberal experiment in medical education. Here is a modern institution built with the preclinical laboratories in closest association with the hospital wards. Physically, the plant leaves nothing to be desired, but in these buildings there is something greater than the structure itself. This intangible element is the spirit of the faculty with its educational idealism. A young group is gathered together, imbued with a spirit of curiosity, not only about the problems of their departmental interests, but also about educational processes. This originating faculty will look upon itself as an educational unit in a great university. It will strive to offer the student the best possible opportunities for learning, for self-education, in

the constantly changing field of medicine. It will strive to stimulate in each student a spirit of scientific inquiry so that throughout his life the graduate will carry on with the ideals and curiosities of a true student.

But not alone on this side of education does the opportunity at Duke University lie open before the medical faculty. It has the opportunity to advance knowledge in medicine through research: the whole field of medical interests lies open before the faculty, in the medical sciences, in clinical medicine, and in the many ancillary branches. This opportunity for research is an essential character of academic medicine; it is the necessary accompaniment of true university teaching in medicine. If anything augurs well for the success of this great undertaking in medical education, it is, in my opinion, the research spirit of the originating faculty and its willingness to start on an educational experiment as expressed in its curriculum, not following blindly the tested arrangements of other schools, but sailing out, in part at least, on the unknown sea of educational procedure. Perhaps this is merely a sign of discontent with what has gone before; rather would I interpret it as a sign of an originality which promises much in medical research and in medical teaching.

CHANGING VIEWPOINTS IN MEDICAL EDUCATION*

By WILLIAM H. WELCH, M.D.,
Professor of the History of Medicine of the Johns Hopkins Medical School,
Baltimore, Md.

Mr. President, Dean Davison, Members of the Faculty and Staff of the Duke University School of Medicine and Hospital, Ladies and Gentlemen:

It is more than an honor and a privilege; it is a genuine delight to me to have the opportunity of participating in these dedicatory exercises. Your President has indicated perhaps some of the reasons why I, personally, rejoice in this great event. But I am sure I express the feelings of all interested in medical education in this country in recognizing the formal opening of this medical school and hospital as one of the most significant events in the history of medical education in this country. It is, of course, of national, I am frank to say, of world-wide significance; but, above all, it is highly significant that it can be safely predicted that its influence will extend from this hospital through the South, which is a cause for the utmost rejoicing not only to those who live here, but to those in all parts of the country. I speak not only for myself, but for all who participated in the interesting events of the day. More than that, I venture to speak on behalf of the medical profession of this country, of President Few, Dean Davison, and his colleagues and all who had to do with the inauguration and development to the present stage of this new venture in medical education.

When Dr. Davison asked me to indicate a theme or topic for my remarks, I, without any hesitation, put down the perfectly obvious one of medical education and medical research, knowing that was all-embracing. He indicated that possibly it might be appropriate to discuss with you the history of medicine and our physicians in the South. I did not feel that I could possibly do justice during the time at my disposal to such a theme, especially as Dr. Shryock, of this University, who is a student of the subject, has already made such valuable contributions; but I do recognize that it is a line of investigation and study of the greatest interest and importance and which, I am confident, will be cultivated in this medical school and university. I know, of course, that what I would have to say has already been said much better by other speakers; but I am in the habit of picking the brains of those who have preceded me and, while Dr. Edsall has told in an interesting way the state of medicine of long ago, nevertheless, there is a certain angle of medical history that I cannot escape discussing with you.

You may imagine how forcibly has been brought to my attention on this occasion the contrast between the conditions and the problems which this new medical school and hospital face and those which we faced forty years ago with the opening of The Johns Hopkins Hospital and The Johns Hopkins Medical School, and I would like rather to develop in some detail what has already been said by the others from that general point of view.

Dr. Edsall pointed out the general condition of medicine a generation ago. When we opened the Johns Hopkins Hospital in 1889, and four

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*Address delivered at the Dedicatory Exercises of Duke University School of Medicine and Duke Hospital, Durham, North Carolina, April 20, 1931, publication in the Southern Medical Journal financed by a grant of funds from Duke University School of Medicine.

years later the medical school, it was approaching the close of what some have called the "golden decade." It was a "golden decade" in the history of medicine. Those who did not live through that period can hardly realize the thrill and enthusiasm attending the unlocking of the great secrets of the causation and spread of that most important group of human diseases, the infectious diseases. During that period were discovered the tubercle bacillus, the bacillus of typhoid fever, the causative agents of pneumonia and Asiatic cholera. One after another these discoveries followed. It was a period of great enthusiasm over the possibilities of the better control and treatment of these important diseases. I was fortunate enough to be brought into early contact with the workers in this field. We all were looking forward, therefore, to the establishment of a hospital and medical school with its opportunity for work in this new field as well as for study in this important and fundamental phase of medical education. There remained, of course, the great field of immunity quite unexplored. We knew the malarial parasite was transmitted by the mosquito, but this was merely the beginning of a new science. I think we might say that an opportunity akin to that which we had, exists now. Today the method of prevention of disease has been so advanced that no medical school meets its obligation in the training of physicians that does not recognize the part the practising physicians play, and their responsibility to the community, in the control and prevention of the spread of diseases.

It is interesting that we dedicate today not only the medical school, but the hospital at the same time. One of the greatest obstacles in the development of medical education in this country has been the difficulty in bringing together the two institutions, the medical school, on the one hand, and the hospital, on the other. We were fortunate, and that has continued to be the greatest asset at the Johns Hopkins, to have had the hospital as a part of the medical school. Seventy years ago it was emphasized that the hospital should be a part of the medical school. The battle is not yet won, still everyone recognizes at present that it is absolutely essential to have the medical school and hospital united so that the hospital shall be in every sense of the word the teaching hospital of the medical school. It is recognized everywhere that a good hospital is an essential part of the medical school, and also that a teaching hospital is the best kind of hospital. It better serves the interests of the community and the interests of the patient.

Again, we come here to dedicate the medical school which is in every sense of the word an integral part of the University. That was not so in a great many schools forty years ago. Harvard Medical School was an integral part of the University, but there were many medical schools only nominally connected with the university, an insignificant connection. But today, what a change! Perhaps nearly all, with only one really notable exception, the Jefferson Medical School, are true, integral parts of the universities. The medical school receives ideas from the university on the one hand and the university is in turn greatly strengthened by the possession of a good medical school. This close relationship between the hospital and the medical school and the inclusion of the combined institutions as an integral part of the university, a combination which was difficult to secure forty years ago, represents a complete change from the past.

There is another problem which we faced and which I do not think has been adequately solved, even at this time. That is, the adjustment of the professional education and secondary and collegiate education in this country. This problem arises partly as the result of the enormous development of the American college. We attempted a solution at the Johns Hopkins which we never regarded as entirely satisfactory and which is certainly not a national standard, by linking the professional school with the college. We based the entrance requirements upon a collegiate degree. The standard adopted here is the national standard, that is, two years of pre-medical work. Either way is an extremely unsatisfactory solution. Of course, if one links with the college at all, beyond the high school, one must fulfill certain requirements, which are regarded in Europe and England as a part of the general training: physiology, general biology, and so on. In an article by Dr. Davison, which appeared in the *Journal of the American Medical Association*, equal importance is given to the character of the applicants and technical requirements.

While the establishment of the Johns Hopkins Medical School may fairly be said to constitute an important step in medical education in this country, everyone who has given any thought to the subject recognizes that this was merely one of numerous factors that brought

forth the amazing change in our standards of medical education. The examples of a few of the better medical schools indeed had their influence. The change was due in no small measure to the action of the Association of American Medical Colleges; but of the greatest importance were the requirements of the licensing boards. There is nothing comparable to the rapidity with which medical education has improved in this country. The number of medical schools has been cut in half during a decade, while the number of law schools has been doubled. Forty years ago, when we faced the problem of the new medical school at the Johns Hopkins, it was perfectly obvious that it would be almost criminal if we did not contribute something to medical education. Today we welcome the addition of a good medical school.

As regards the character of medical education at that time, the contrast with that of the present, of course, is very great. At this time we cannot contemplate with much satisfaction the history of medical education in this country for the first three-fourths of the past century. At the same time, as I have pointed out, the results were often better than the history. The great need was to establish in the first place the fundamental pre-clinical sciences upon a firm foundation, by establishing all of the pre-clinical sciences, pathology, bacteriology, anatomy, physiological chemistry upon a sound, full-time basis. I think we have made an important contribution in placing the pre-clinical subjects upon this basis. I also think that Osler, in the establishment and conception of a clinic, made an important contribution. It was the first that was really deserving of the name of a medical clinic. I have taken occasion to call the attention of clinicians to the use of the term "clinic," which, of course, bears some relation to the bed and patient. Osler's conception of a clinic was one with a staff, budget, laboratories, and an organization in which those engaged in the work of the clinic, some of them, if not all, were permanently attached to the clinic, a combination of the German conception and the English conception, which constitutes a contribution in that period equal to the establishment of the sciences upon a full-time basis. He could not have done justice to the clinic if he had had an absorbing outside practice. Had not Osler undertaken to establish such a clinic in a systematic and logical way, the situation would not have arisen where no good medical school would agree to put in charge of its clinical departments any one who would not regard them as the major interest and consideration of his life.

It was indicated today by Dr. Weed and others that there is a good deal of dissatisfaction with the result of our modern medical education. As one speaker said, it is characteristic of our profession to be discontented with the existing situation. But in some parts of the world today there is no less an attack upon the methods of training physicians which exist today than upon the training of the scientists in the laboratories. We hardly encounter as frank criticism in this country as in Germany, where there is a belief in the entire separation of the art of healing and the science of healing. This division is as old as the history of medicine. It is almost congenital. You are born of those who place all emphasis upon technical training on one hand, or of those, on the other hand, who place the emphasis upon the science to be applied. I belong to those who believe that the best emphasis is placed upon training in the fundamental sciences, that the routine application is not to be neglected, but I should be most reluctant to believe that the best training for a physician is a purely routine and technical one.

It is the obvious aim of medical education to make good doctors. I was very glad today to meet Dr. Wingate Memory Johnson, of this State, whose article in the March number of the *Atlantic Monthly* seems one of the most sensible and timely articles on medical education and the cost of medical practice. I believe the type of medical man that Dr. Johnson has in mind is better developed with a sound scientific background, without too much emphasis on the technical training of medicine. He places great emphasis on the family doctor and very justly. While the family doctor need not necessarily be a specialist, he should, however, be so well grounded in the science of medicine that he is capable under all circumstances of advising the family whether the patient needs to consult a specialist. I think that type of family doctor or family advisor could be developed better if he had a good scientific rather than technical training.

It is impossible to teach all the contents of medicine. I think the ultimate aim in the medical school is to put the graduate in a position where he can continue a life-long education to the best advantage. The point of view, the spirit of curiosity, a dissatisfaction with merely

accepting conditions; the interests, and I would emphasize that greatly, the interest in the study of the problems of the patient and the problems of disease, these are the matters of first importance. I think all of this is better secured at present in the grounding of the scientific principles of medicine and treatment than in concentrating merely on the routine of the technic. After getting the medical degree, education really, in a sense, just begins. If you put the graduate in that position where he must read intelligently, study intelligently, observe intelligently, it is perfectly obvious that he will develop better with a sound scientific background than with the mere routine and technic. That is what is needed today.

So I emphasize the scientific study of the problems of disease. The real home of research is the university. It would be a calamity if those in the university did not take this view and accept the challenge. I think it is highly important that the members of the faculty realize there is something of special merit in the teaching of those interested in promoting knowledge, not merely retailing something handed down but communicating something that is a part of them, even though the individual may not be a gifted speaker.

One is always tempted to stress the subject that for a decade or more he has dwelt upon. In my case it is the importance of preventive medicine. Preventive medicine stands very high in the reduction of the death rate. It is unfortunate that we have a sharp line between curative and preventive medicine. The graduate should be imbued with a sense of his responsibility to the community as well as to the patient. This was forcibly brought to my attention in the Scandinavian countries. They have such a low mortality, particularly infant mortality, that I tried to find out the reason. One explanation is that they are all trained to have as much interest in preventing the spread of disease as in curing it. All our curricula should be permeated with the idea of preventive medicine. Not merely diagnosis and treatment should be taught, but how the disease originates and spreads and what is to be done to prevent further spreading demands its place. This is a threadbare theme today, but I think more and more that the distinct importance of the preventive aspect should be impressed upon teachers. They should in their turn point out how disease originates and spreads. One reason why certain parts of the medical field have been encroached upon by public health officers is that they have not been preempted by the medical profession.

But my ratio pro is no longer preventive medicine, but the history of medicine. This belongs to the cultural, the humanistic side. The kind of interest that Osler had adds immensely to the pleasure of the practice of the profession, adds a joy and a relief to it; also makes better doctors. We should consider what that love of books and love of literature on Osler's part meant in his life, in his relation to the students, to the faculty, and to the patients. I have just seen a recent book by Charles Joseph Singer, "An Introduction to the History of Biology." He brings the historical background up to the present conditions of the problem. I am quite sure that the kind of interest will improve the quality of scientific investigators and that it will also make better doctors. The historical side is the principal and about the only one which tends to do that. I plead for a little more of the cultural side in medicine. The doctor is much more likely to have an influence with the community and a grasp of its problems, economic, political, and social, if he has this cultural background. Again, therefore, I would emphasize the very interesting working up of medical history in the South. You have here a field which I believe is already explored to quite an extent. There is a great contrast in many ways between the fundamental problem which this medical school faces and those which we faced forty years ago in the enterprise at the Johns Hopkins Medical School. The very fact that there has been this change in the problem is significant. We should never allow the curriculum of medical training to become rigid. It should always be in a state where it can adapt itself to changing conditions and knowledge.

In conclusion, let me say, Mr. President, I would like to thank you, Dr. Davison and all who have been concerned in the arrangements for this extraordinarily interesting day, and to express appreciation for your hospitality and the stimulus we have received. It has been a perfectly wonderful day; it is more than a delight; it is really the fruition of the hopes and wishes of one who has engaged in medical work for more than fifty years, an experience which gladdens one's heart.

Southern Medical Journal

JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Single copies 35c each.

Entered as second-class matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

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Vol. XXIV DECEMBER 1931 Number 12

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Sixth Annual Meeting
Birmingham, Alabama, November 16-18, 1932

THE NEW ORLEANS MEETING

A quarter of a century old is the Southern Medical Association, and waxing in strength and *joie de vivre*. Hard times have been mentioned this year by the uninformed, while increasing prosperity has been acclaimed in many newspapers. The New Orleans meeting, one of the largest in the history of the Southern Medical Association, bears out the belief that the professional work of the nation is being carried on at its normal rate, certainly and most particularly in the South. The meeting showed a registration of fifteen hundred physicians, with a grand total of twenty-five hundred persons, counting medical students, women guests and those with the exhibits—one of the largest in its history.

The huge Municipal Auditorium of the Crescent City, its comfortable hotels, its historical sites, and splendid hospitals, made for the convenience and general interest of the meeting. New Orleans has a tradition of medical culture older and better established than that of many other cities below the Mason-Dixon line. Tulane University includes one of the best known medical schools of strictly Southern origin which can boast of a high reputation over a number of years. Several newer medical colleges are now rendering excellent service in the South, turning out graduates of which the country may be proud, but Tulane has the dignity of having held its distinction over a long period of time. Its progress has not slowed with age, but has been quickened by inoculations of new men and ideas on the faculty, and by magnificent equipment which has made their work easier.

New Orleans has clinical material which could readily support several medical colleges, as well as a large group of men without academic connections. It now boasts, in addition to Tulane, a new four-year medical school, a part of Louisiana State University, which is completely manned and functioning. Its recently erected sky scraper for teaching purposes is second to that of no other medical school in the world in the modernity of its details. The hospitality and generosity of Louisiana State University Medical School, of Tulane, and of the many non-academic members of the profession, to the Southern Medical Association in the past month made its visit most enjoyable.

The three-day program of the twenty-fifth meeting provided a highly satisfactory arrangement of activities. The human mind can keep itself keyed up to the fever-high convention tempo for three days and profit by it. After more than three, it needs must retire like Saint Gandhi, with its new ideas, to dedicate itself to silence and to fasting.

The general clinics of the opening day, arranged by this year's president, Dr. Felix J. Underwood, were excellently attended and offered an unusually valuable bird's-eye view of modern medical methods for every-day use. The clinics of the local men, on the third day, arranged by Dr. Isidore Cohn, presented medical and surgical material which could not have been obtained elsewhere. The section and special meetings, distributed over the three days, provided meat, dessert, and medical entrees, fresh and at the correct temperatures, in courses as one might choose them.

The large number of scientific exhibits made available many recent studies of Southern investigators. They furnished also a meeting place where one might talk personally with physicians erudite in particular lines. The committee on awards had great difficulty in coming to a conclusion which would place one exhibit above another in merit, since many were of high quality,

but reported as follows: The first award went to Dr. Alton Ochsner and his associates, of the Department of Surgery, Tulane University School of Medicine, for their exhibit on experimental surgery*; the second to Dr. Roy R. Kracke, of Emory University, Georgia, for his exhibit of studies of etiology, bacteriology and pathology of granulocytopenia (agranulocytosis); and the third to Dr. Earl C. Padgett, Kansas City, Missouri, for his exhibit on plastic surgery.

The technical exhibitors have accepted their responsibility to provide the best, and to educate the medical profession to buy the best, in books, new instruments, foods, and drugs. They no longer function merely as salesmen of a particular product, since some of their houses maintain research laboratories as extensive as those of the universities. Physicians were glad to go through their booths between lectures, and to take special time for study and evaluation of the technical exhibits.

Socially, during the meeting, New Orleans was at its most charming, and New Orleans' social charms, like its medical culture, are older and far greater than those of the average American city. Men and women guests were received as close acquaintances and welcomed by physicians and by the perfectly functioning Women's Medical Auxiliary. There was a personal friendliness and hospitality in the welcome unlike that of any other city toward any other convention.

*The exhibit consisted of reoentgenograms and illustrations of surgical research upon the following subjects:

The Relative Effects of Heat and Cold in the Treatment of Peritonitis.—From experimental observations there are indications that the application of heat and cold to the abdomen in the presence of peritonitis is of value. However, there is relatively little difference in the results obtained by the application of heat and those obtained by application of cold, except that the animals which died lived, on an average, a longer period of time following the application of heat than did those following the application of cold.

Mechanical and Adynamic Ileus, Especially the Effect of Splanchnic Block, the Various Peristalsis Stimulating Drugs, Hypertonic Solutions, and Glucose and Insulin.—Of the various drugs, only eserine was found to be of any value as a stimulant of the intestinal musculature in the presence of ileus. Splanchnic block and hypertonic saline solution were found to be efficacious in the relief of ileus. Glucose and insulin exerted characteristic effects on both normal and obstructed intestines, glucose inhibiting the intestine and insulin activating it.

The Early Diagnosis of Ileus by Means of Plain Roentgenograms of the Abdomen.—It was found that in the presence of strangulation, x-ray evidence occurred earlier than in simple obstruction.

The Effect of the Intravenous Injection of Sclerosing Substances on the Venous Endothelium.—Twenty different sclerosing agents were used, and histologic examination was made of the sections, which were removed at varying periods of time from one-half hour to eight weeks. In spite of extensive destruction of the endothelium, relatively few thromboses occurred because of a rapid regeneration of endothelium, which took place between the fourth and sixth days.

The Occurrence and Reformation of Peritoneal Adhesions by Means of Digestive Ferments.—Of the digestive ferments, papain was found to be most efficacious in the prevention of the formation of adhesions.

Thanks for the most pleasurable as well as the most instructive of meetings are due to the General Chairman of the New Orleans Committee, Dr. Frederick L. Fenno; to the President of the Orleans Parish Medical Society, Dr. Emmet Erwin; to Mrs. W. R. Buffington, Chairman of Women's Activities; and to the chairmen of other committees and to the many members of the local profession through whose labors the Association was able to enjoy a most profitable meeting.

Newly elected officers of the Association for the coming year are: President, Dr. L. J. Moorman, of Oklahoma City, Oklahoma; First Vice-President, Dr. Frederick L. Fenno, of New Orleans, Louisiana; Second Vice-President, Dr. Charles Hartwell Cocke, of Asheville, North Carolina; Secretary-Manager (for a term of five years), Mr. C. P. Loranz, of Birmingham, Alabama; Editor of JOURNAL (for a term of three years), Dr. M. Y. Dabney, of Birmingham, Alabama; Assistant Editor of JOURNAL (for a term of three years), Mrs. Eugenia B. Dabney, of Birmingham, Alabama; Chairman of the Council, Dr. Homer Dupuy, of New Orleans, Louisiana; and Chairman of Board of Trustees, Dr. C. C. Bass, of New Orleans, Louisiana.

The annual meeting in 1932 will be held in Birmingham, Alabama, for many years headquarters of the Association.

THE LUBECK CATASTROPHE

Certain medical discoveries, for example, that of insulin, and that of visualization of the gallbladder with tetraiodophenolphthalein, made in one part of the world, have spread within a few months to every country and been accepted in every language in which there is an acquaintance with scientific medicine. Their value goes uncontradicted. Other "discoveries," such as many on the cause and cure of cancer, have aroused as intense interest for a few weeks and been forgotten. Between these extremes are proposed medical methods hotly sponsored by famous scientists their proponents, and as hotly derided by equally distinguished opponents. They are neither wholly accepted nor do they die. The disagreement of authorities is what makes the practice of medicine difficult.

Some years ago Calmette, internationally known bacteriologist of the Pasteur Institute in Paris, reported development of a harmless living vaccine which he administered orally for the prevention of tuberculosis among newly-born

children of tuberculous families.[1] The studies of Calmette and his associates upon the *Bacillus Calmette-Guerin* aroused enthusiasm in many parts of the world. In France, the use of B.C.G. inoculations quickly became widespread, and many other European countries adopted a similar wholesale vaccination program. Calmette reports no danger to the children who receive the bacillus, and even an increased well being and general resistance of those vaccinated.[2] His work has been many times confirmed by disinterested physicians. In America, the bacteriologist, William H. Park, has confirmed the French work, and many American reports, as that of Litterer,[3] and of Overton,[4] in Nashville, have favored its use. It has, however, obtained no widespread introduction in this country.

The work has been criticised on two main grounds: (1) that statistics of its beneficial effects have been poorly controlled. Calmette cites the falling death rate from tuberculosis in some parts of France as evidence of the value of the vaccine, although it is well known that the death rate of tuberucolsis is falling all over the civilized world without vaccine.[5] The second objection, which has been reenforced by isolated reports from various parts of the world, is that B.C.G., an attenuated living tubercle bacillus cultivated on a special glycerin-bile-potato medium and reputedly of no virulence, occasionally reverts to its original virulent form and induces the disease which it is claimed to prevent. Calmette[2] replies to these objections by citing reports of thousands of vaccinated individuals in France and elsewhere who have not contracted tuberculosis, and by recalling that the antirabies virus is merely an attenuated form of a virulent rabies strain, the cow pox virus is an attenuated strain of small pox, and that neither of these has ever been known to regain its power of producing the disease.

What is referred to in foreign journals as the "Lubeck catastrophe" bears intimately upon the question of the inocuousness of B.C.G. The tragedy of the deaths of more than seventy vaccinated babies in the small German village of Lubeck has been very competently reviewed in the *British Medical Journal*.[6] The circumstances leading up to a legal trial which involves several hundred plaintiffs against all doctors concerned in the administration of the vaccine are described as follows:

A strain of B.C.G. was sent by Calmette from the Pasteur Institute to Dr. Alstaedt, Chief of the Lubeck Board of Health, and given by him to Professor Deycke, Director of the Laboratory of the Municipal General Hospital. Upon its arrival, the culture was tested and found to be non-virulent for guinea pigs. Under Professor Deycke's supervision the vaccine was prepared for administration to patients, by a technician of seventeen years' experience in laboratory work. It was maintained in media containing egg yolk instead of in the media recommended by Calmette.

During the early months of 1930 the vaccine was given to 252 babies born in the hospital. The first child who received it contracted tuberculous lymphadenitis, which it was believed to have acquired from its mother. The second child inoculated remained well. The third developed a mild tuberculosis. Late in April two more babies died with manifest tuberculosis, the danger of the vaccine was realized, and the inoculations were then stopped. Eventually more than seventy-five of the infants vaccinated developed tuberculosis, however, and died. Others had subacute lesions. A considerable proportion remained quite well.

Upon recognition of the pathogenic nature of the vaccine, Professor Deycke, to avoid error, destroyed all traces of it in the laboratory, together with the existing subcultures of B.C.G. "This unfortunate step, which was clearly open to more than one interpretation," says the *British Medical Journal*, "added greatly to the difficulties of the investigation."

Only one other strain of *B. tuberculosis* was found in Professor Deycke's laboratory, a strain isolated from a human case. Investigators of the tragedy who favor the prophylactic use of B.C.G. have attempted to show that this virulent culture was accidentally used in preparation of the vaccines. Others have held to the hypothesis that the cultures of B.C.G., a few of which were eventually unearthed, contained organisms virulent for animals.

Quoting the *British Medical Journal* again: "To assert, as does Calmette, that in all these

1. Ed., Filterable Forms of Tuberculosis. Sou. Med. Jour., 22:686, 1929.
2. Calmette, Albert: Preventive Vaccination Against Tuberculosis. J.A.M.A., 96:58, 1931. Paris correspondent J.A.M.A., J.A.M.A., 97:260, July 25, 1931.
3. Litterer, Wm.: Experimental Studies on Calmette's B.C.G. Vaccine. Sou. Med. Jour., 22:955, 1929.
4. Overton, John: Observations on the Use of B.C.G. Vaccine in Nashville, Tennessee. Sou. Med. Jour., 24:878, Oct., 1931.
5. McCain, P. P.: Tuberculin Test and the X-Ray in Tuberculosis Control. Sou. Med. Jour., to be published.
6. Ed., The Lubeck Catastrophe. Brit. Med. Jour., p. 986, June 6, 1931. B.C.G. Trial at Lubeck, Ibid, No. 3693, p. 712, Oct. 17, 1931.

experiments [in which B.C.G. is reported to have become virulent] the culture is contaminated, is to offer an excuse that becomes increasingly tenuous. No one not completely ignorant could maintain that a given culture is of fixed and immutable virulence." The trial is being watched with interest, though it is frankly impossible to decide the cause of the disaster. Meanwhile the point is obvious upon which all may agree, says the *British Medical Journal:* that the preparation of vaccines should be most rigidly controlled and permitted only in laboratories set aside for this purpose.

The dispute temporarily puts bacteriology in the ranks of the most inexact of the medical sciences. The expert testimony at the trial will probably be as conflicting as the evidence of alienists at the Leopold and Loeb trial of a few years ago.

GLEANINGS FROM RECENT JOURNALS

Profits of Research.—Maurice Hindus, an American who was born in a small Russian village, is one of the most fluent, graphic, and apparently unbiased of the observers of modern Russia. In his recent book, "Red Bread,"[1] he describes the *kolhoz,* or collective farm, the attitude toward it of the *koolacks* in the country, those peasants who chanced to own two or three cows and a dozen chickens and who were ruined or exiled upon the forcible spread of the *kolhoz* plan; and again, the attitude of those who have fallen wholeheartedly in with the government's effort to prevent private ownership of more than a minimum of property. Returning to his native village, Hindus finds the typical narrow strips of land with weedy ridges between, which the peasants used to cultivate, eradicated in many places, and tractors and harvesters and other modern machinery running over broad acres. Walking along a muddy road he chances to meet a small boy, a ten-year-old, whose father is a *kolhoznik,* or one who works on a collective farm. After a little talk he asks the boy:

"And would you like to be rich?"

He laughed and did not reply.

"Why do you laugh?"

"Because it is foolish to be rich." He laughed again. Then sobering, added: "Rich people exploit the poor."

"Wouldn't you like to have things of your own—a lot of real things?"

"No," he said, staring at me with curiosity and some suspicion.

"Supposing someone gave you an automobile, a lot of land, horses, cows. Wouldn't you be glad?"

"I'd turn them over to my father's kolhoz," he answered.

"You would?"

"Of course." After a reflective pause he added: "In our Soviet Union, citizen, we have deposited the word riches in the archives."

One of the products of modern research is the drug, theelin, a crystalline sex hormone, the isolation of which aroused interest all over the civilized world. Many nostrums have attempted to confuse the popular understanding of it and to claim the incorporation of theelin in their products. In order to safeguard the scientific integrity and academic interest of Doisy's discovery, says the *Journal of the American Medical Association,*[2] the St. Louis University School of Medicine has devised a plan for its distribution which is essentially as follows: the discoverer, Dr. E. A. Doisy, and his associates, have assigned any patent rights—process or product, to their school. A committee, one of whom is the discoverer, has the privilege of naming the product. One pharmaceutical house is to be licensed exclusively for a limited period to make it. Later, a non-exclusive license will permit a limited number of other firms to produce theelin, all under the same non-proprietary name. All manufacturers are to submit their products to the Council on Pharmacy and Chemistry for examination, and the firms are to submit all advertising matter to the committee before it is published. Such royalties as may accrue will be returned to the University, to be used for research, none to revert to the personal benefit of any individual.

This general plan of dedicating the profits of a new medical discovery to one's university was employed by Banting and his co-discoverers of insulin at the University of Toronto. It has been less generally used abroad. In European countries the profits of research more customarily go to the individual. Has not this well endorsed American plan to prohibit any individual's benefiting from his discoveries, something of the savor of the expression of the small Russian lad, the son of the *kolhoznik,* who if he received a gift would turn it over to his father's *kolhoz?* What is the fundamental difference between the principles of the research worker who has also put the word riches into the archives, and the *kolhoznik?* And could the university be construed to be an *anlage* of the *kolhoz?*

1. Hindus, Maurice: Red Bread. New York: Jonathan Cape and Harrison Smith, 1931.

2. Ed., Theelin—and the Technic of Introduction of New Drugs. J.A.M.A., 97:1541, Nov. 21, 1931.

Anterior Pituitary Extract.—Since the recent announcement in a clinical journal by Bengtson[3] that hair had grown upon sixteen bald heads following administration of anterior pituitary lobe extract, there has probably been a rush to corner the market on this preparation. Whether the makers of toupees will be harmed by the movement remains to be seen.

Seekers after youth will derive new encouragement from the studies of Evans and Simpson,[4] of the University of California, who have confirmed the reports of hypertrophy of the accessory organs of reproduction, and of a definite increase in the sex activity of old animals who received implantations of anterior pituitary lobe.

It is to be recalled that there are five hormones of different effects reported to be obtainable from the anterior pituitary gland, and their relationships in different species of animals seem to be very different. Some harmful effects have been observed. In female rats, the formation of multiple mammary tumors, adenofibromas, follows injections of alkaline anterior pituitary extract.[4] A pronounced luteinizing effect upon the ovaries has also been repeatedly observed.

Cause of Thyroid Enlargement.—Loeb and Friedman,[5] of Washington University, among others, report hypertrophy and hyperplasia of the thyroid gland following injections of acid anterior pituitary extract. Some forms of goiter are possibly due to overactivity of the anterior pituitary and are not actually improved by dissection of the thyroid.

When the anterior pituitary is destroyed, the cortex of the suprarenals atrophies, and subsequently also the testes atrophy. When the cortex is destroyed, the testes degenerate within a very few days.[6] After castration, the pituitary increases its output of gonad stimulating hormone.[4] Apparently no endocrine disorder can be single. These effects are summarized with no intention of encouraging polyglandular therapy; rather to warn the uninitiated of the difficulty of diagnosing *in vivo* the fundamental disorder.

Extract of the Suprarenal Cortex.—Hartman and Thorn[7] claim that cases of asthenia are improved by cortin. The expense of this product prevents any elaborate clinical investigation to confirm or refute its potentialities.

Virus of the Common Cold.—Dochez, Mills and Kneeland[8] have cultivated the virus of the common cold in tissue medium through fifteen generations, with infection of two human volunteers after seventy-four days. November is one of the chief "cold" months, when this minor disease to which no one is immune extends its grasp and causes a summation of discomfort greater than that of many of the more deadly plagues. Sufferers will read of cultivation of the virus with ever-recurring hope, and continue to await the long-delayed specific vaccine.

Failure of Prophylaxis of Measles with Adult Blood Serum.—Prevention of measles, or amelioration of its symptoms by administration of parents' serum, has been endorsed in several quarters and has achieved some popularity. Parents' or adult blood serum is usually to be obtained without great difficulty. Blauner and Goldstein,[9] who used professional donors' blood to prevent an epidemic of measles in a child-caring institution in New York, report an increase of incidence of the disease in those who received the treatment. Forty per cent of the controls without serum escaped the disease, while only 12 per cent of those who were injected failed to contract it. One might postpone attempted immunizations of exposed children with adult blood for a time, in consideration of these findings.

3. Bengtson, B. N.: Pituitary Therapy of Alopecia: A Preliminary Report. J.A.M.A., 97:1355, Nov. 7, 1931.
4. Evans, H. M.; and Simpson, M. E.: Hormones of the Anterior Hypophysis. Endocrinology, 15:511, 1931.
5. Loeb, Leo; and Friedman, Hilda: Changes in Weight of the Thyroid Gland of the Guinea Pig Under the Influence of Acid Extract of the Anterior Pituitary. Proc. Soc. Exper. Biol. & Med., 29:15, Oct., 1931.
6. Freed, S. C.; Brownfield, B.; and Evans, H. M.: Effect of Adrenalectomy on Testes of Rat. Ibid., p. 1.
7. Hartman, F. A.; and Thorn, G. W.: Effect of Cortin in Asthenia. Ibid., p. 49.
8. Dochez, A. R.; Mills, K. C.; and Kneeland, Y.: Cultivation of the Virus of the Common Cold in Tissue Medium. Ibid., p. 64.
9. Blauner, S. A.; and Goldstein, H.: Epidemic of Measles: Attempted Prophylaxis with Whole Blood. Amer. Jour. Dis. Child., 42:803, Oct., 1931.

Book Reviews

Psychopathology: Its Development and Its Place in Medicine. By Bernard Hart, M.D. (Lond.), F.R.C.P. (Lond.); Physician in Psychological Medicine, University College Hospital and National Hospital, Queen Square, London. 178 pages. New York: The Macmillan Company. Cambridge: The University Press, 1929. Cloth, $2.75.

Hart outlines briefly the growth of psychology and a critical review of the tenets of the various schools of today. In this edition a new chapter on "The Conception of Dissociation" has been added. This covers the work of Janet and Freud and gives a more logical consideration of the author's view of their contributions.

Food Allergy. By Albert H. Rowe, M.S., M.D., Lecturer in Medicine in the University of California Medical School, San Francisco, California. Philadelphia: Lea & Febiger, 1931. Cloth, $5.00.

This monograph, as Dr. Rowe describes it himself, is well written and instructive. His elimination diets are familiar to those who try to keep up with current ideas in the treatment of allergy. This book will be helpful both to the physician and the dietitian who are treating this type of patients.

There is one danger in the book and that is that one may get the impression that food allergy is a separate entity. As a matter of fact in the majority of cases food allergy is merely a part of the picture and in treating cases many disappointments will be encountered if the whole allergy picture is not taken into consideration.

The type is good and the style is easy to read.

Discovering Ourselves. By Edward A. Strecker, A.M., M.D., and Kenneth E. Appel, Ph.D., M.D. 306 pages with tables and charts. New York: The Macmillan Company, 1931. Cloth, $3.00.

Strecker and Appel give a ground work for a concept of psychology in the opening chapters. As the reader goes deeper into the book he is shown the relation of the mind to the body and the channels by which lives are controlled. To aid the student in his orientation of the subject, each chapter ends with a resume, in which the main ideas are presented tersely. The physician will find the text not only interesting, but well worth the effort of reading.

Selected Readings in Pathology from Hippocrates to Virchow. Edited by Esmond R. Long, Professor of Pathology, University of Chicago. 301 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1929. Cloth, $4.00.

These "readings," which begin with the Father of Medicine, Hippocrates, include a brief sketch of each author and selected writings illustrative of his best work. The volume is not large, and the fragmentary nature of some of the excerpts tantalizes the reader. It is to be hoped that, encouraged by this splendid work, the author or some one else will collect the entire writings of these epoch-making contributors to medicine into one set of books, so that those living away from large medical centers may become acquainted with more of the original writings of such masters as Harvey, Laennec, Corrigan, Graves and the many others whose original contributions are not generally available. This is one of the best medical contributions of the year.

Gynecology and Urology for Nurses. By Samuel S. Rosenfeld, M.D., F.A.C.S., Adjunct Obstetrician and Gynecologist, Lebanon Hospital, New York City. 230 pages with illustrations. New York: William Wood & Co., 1931. Cloth, $2.00.

This small manual is divided into two parts: the first deals with gynecology, the latter with urology. Each consists of an anatomical description of the parts, short narratives of the pathology, directions for the setting up of instruments for the various operations, and postoperative care. Care has been taken not to include details which the nurse need not know.

What the Public Should Know About Childbirth. By Walker Bourne Gossett, M.D. 290 pages. Minneapolis: The Midwest Company, 1931. Cloth, $2.00.

From statistics and the utterances of others, who are quoted in great detail, Dr. Gossett reaches the conclusion that as a class we are less efficient accoucheurs than those of twenty other countries. It is interesting to note that the medical profession seems to delight in hurling maledictions on its own head not only among physicians, but to the public at large.

There are many arguments against the comparison of national statistics. The lack of prenatal care is unjustly laid at the door of the physician in this text, although it is proven that women are becoming educated to its value slowly.

Again the lack of proper medical education is deplored by Dr. Gossett. However, the young man practises asepsis, not the old country practitioner, who washes and greases his bare hands and delivers, sans gloves, sans antiseptics and sans sterile linen, who then departs not to return unless complications set in.

Interesting is the history of obstetrics, the chapter on superstition and birth customs and obstetrical procedure in Catholic hospitals. They are well worth reading, but why offer such conceptions to the public? The medical profession is offering adequate care to a public which is self-satisfied.

The Commoner Nervous Diseases. For General Practitioners and Students. By Frederick J. Nattrass, M.D., Dunelm., F.R.C.P. (Lond.), Assistant Physician, Royal Victoria Infirmary, Newcastle-Upon-Tyne. 218 pages with illustrations. New York: Oxford University Press, 1931. Cloth, $4.00.

Dr. Nattrass, after reviewing the principles of neurologic diagnosis, describes nineteen diseases and symptoms which he calls the more common. Among these are lues, disseminated sclerosis, myelitis of the neuritides, epilepsy, paraplegia, vertigo, migraine and chorea. While classical symptoms are described, more attention is given to the vagaries of these commoner symptoms. Anatomy and rarer symptoms are merely mentioned. The greatest emphasis is laid on early diagnosis and treatment, as in the early cases a better prognosis is usual. This form of presentation gives a more generalized text, but is a delightful departure and worthy of perusal.

General Bacteriology. By Edwin O. Jordan, Ph.D., Professor of Bacteriology in the University of Chicago and in Rush Medical College. Tenth edition, entirely reset. 819 pages, fully illustrated. Philadelphia: W. B. Saunders Company, 1931. Cloth, $6.00.

The more extensive revisions have been made in the sections on variation, undulant (Malta) fever, the paratyphoid group, pathogenic yeasts and the anaerobes. The bacteriophage phenomenon is given in greater detail. Dr. Jordan presents his subject in a straightforward manner which has made this text a favorite. As heretofore, no attempt has been made to exhaust the field, the postgraduate being referred to more specialized treatises.

BOOK REVIEWS continued on page 1147

Book Reviews

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Medical Electricity for Students. By A. R. I. Browne, Member of the Society of Radiographers. 245 pages with illustrations. New York: Oxford University Press, 1931. Cloth, $4.00.

The first edition of this excellent book for beginners appeared in 1923. Starting with the basic principles in the production of the different currents, the student is led to a description of these currents, their application and the different forms of apparatus for applying them. The third section of the book concerns itself with electrical treatments. For convenience ultraviolet medication is described and a syllabus of the Chartered Society of Massage and Medical Gymnastics is included. The student will find this a practical text.

A Text-Book of Pathology. By Francis Delafield, M.D., LL.D., Sometime Professor of the Practice of Medicine, College of Physicians and Surgeons, Columbia University, New York, and T. Mitchell Prudden, M.D., LL.D., Sometime Professor of Pathology, College of Physicians and Surgeons, Columbia University, New York. Fifteenth Edition. 1339 pages with 839 illustrations and 20 full-page plates. New York: William Wood & Co., 1931. Cloth, $10.00.

Dr. Prudden continues to carry on the work which was started by Dr. Delafield fifty-nine years ago. Thirteen years after the first edition of Dr. Delafield's work, Dr. Prudden assisted in the preparation of the text. This joint authorship enlarged the scope of the work and enhanced the value of the book. Since the last revision four years ago a great deal of work has been done on the endocrine substances. There have been further investigations of the parathyroids and their relation to ostitis fibrosa cystica. Aschheim and Zondek have developed a diagnostic test for pregnancy based on the secretion of the anterior lobe of the pituitary gland, and Swingle's isolation of the suprarenal cortex hormone promises to give relief to many.

As heretofore, the text covers a large field which is steadily increasing in vastness and in the limited space it can do no more than briefly describe a condition. However, references have been brought up to date and the essentials have been revised where needed. The text continues to offer to the student an excellent grounding in the study of pathology.

Southern Medical News

ALABAMA

The County Health Unit of Wilcox County held clinics during August for the removal of tonsils, the first at Camden with Dr. J. C. O'Gwynn, of Mobile, in charge, assisted by Dr. Heustis Jones, Dr. Will Moore, Dr. Ernest Bonner, and Dr. Paul Jones; and the second at Pine Hill with Dr. R. J. Grayson, of Selma, in charge, assisted by Dr. Robert Dixon, Dr. Walter Fudge, Dr. P. E. Godbold, Dr. F. F. Kimbrough, and Dr. K. A. Mayer; also Dr. R. A. Irons, of Thomasville.

Chest clinics were held in Evergreen during the week of September 7 with Dr. P. W. Auston in charge. Sixty-five patients were examined and a number of x-rays were made.

The Southeastern Division of the Alabama State Medical Association met on October 6 at Clanton with the Chilton County Medical Society as host. Among the guest speakers were Dr. M. Y. Dabney, Birmingham; Dr. W. W. Harper, Selma; Dr. Fred Wilkerson, Dr. J. Harold Watkins and Dr. J. N. Baker, Montgomery; and Dr. J. B. Woodall, New Brockton.

Deaths

Dr. Robert Hadden Hale, York, aged 81, died October 2 of cardiorenal disease.

Dr. John Newton Killough, Birmingham, aged 66, died November 2.

Dr. Thomas C. Kirven, Jackson, aged 72, died August 10.

Dr. Thomas Knox Mullins, Huntsville, aged 56, died September 19 of heart disease.

Dr. Charles Henry Schwaemmle, Mobile, aged 62, died August 30 of diabetes mellitus.

ARKANSAS

The University of Arkansas Medical School, Little Rock, opened September 16 with only two changes in the faculty. Dr. Albert F. DeGroat was appointed Assistant Professor of Pathology, succeeding Dr. Emmerick von Haam; Dr. George Lewis was appointed Head of the Department of Surgery.

Dr. A. G. Henderson, formerly of Jonesboro, has moved to Imboden.

Colonel Jay R. Shook has been made Head of the Army and Navy General Hospital, Hot Springs, succeeding Colonel William J. L. Lister, who has retired.

Dr. William M. Parker, DeValls Bluff, and Miss Georgia Eloise Zearing, Glen Ellyn, Illinois, were married August 4.

Deaths

Dr. Henry Thibault, Scott, aged 53, died September 15, after a long illness, of tuberculosis.

DISTRICT OF COLUMBIA

Dr. H. McG. Robertson, U. S. Public Health Service, has been transferred from the American Consulate, Glasgow, Scotland, to Washington.

Dr. Ray Lyman Wilbur, Secretary of the Interior, Washington, has had conferred upon him the honorary degree of Doctor of Laws by the University of the State of New York.

Dr. Franklin F. Murdock, Acting Executive Officer of the Naval Medical School, has been appointed Professor of Tropical Medicine, George Washington University School of Medicine.

The Medical Society of the District of Columbia is giving a series of free lectures in Washington during the winter on public health education. These lectures will be given on Sunday afternoons by Dr. James P. Leake, Dr. William A. White, Dr. Wallace M. Yater, Dr. Henry C. Macatee, Miss Margaret M. Nicholson, and Dr. James A. Flynn.

Deaths

Dr. John Watson Shaw, Washington, aged 65, died September 4 of malignant tumor of the kidney, with metastasis to the liver.

FLORIDA

Dr. W. M. Shaw, Jacksonville, has been elected President of the Hope Haven Hospital Staff; Dr. Thomas M. Palmer, Vice-President; and Dr. F. L. Fort, Secretary.

Dr. Jack Halton, Sarasota, has returned home after attending medical meetings and clinics in the East.

Dr. S. A. Shoemaker has returned to Orlando after spending three months in the Eye, Ear, Nose and Throat Clinic of Chicago.

Dr. F. M. Watson has been appointed to the medical staff of the Florida State Hospital, Chattahoochee.

Dr. C. W. Pease has been appointed District Medical Officer for the East Coast, succeeding Dr. W. A. Claxton, who has been made general Health Officer at Large for the State.

Dr. A. C. Hamblin, Tampa, was recently put in charge of the public health work of the Tampa district.

Dr. H. Mason Smith, Tampa, President of the State Board of Health, and Dr. Henry Hanson, State Health Officer, were representatives of the Board at the recent meeting of the American Public Health Association in Montreal, Canada.

Dr. W. R. Schnauss, Jacksonville, has been appointed Supervising Medical Director of the Jacksonville Brewster Hospital, succeeding Dr. John E. Boyd.

Dr. C. W. Boyd, who has been serving as intern at the Duval County Hospital, has moved to Gainesville, where he will be associated with Dr. G. C. Tillman.

Dr. Raymond Keith O'Brien, St. Petersburg, and Miss Zita Norpell, Chicago, Illinois, were married June 24.

Deaths

Dr. Ezra Theodore Campbell, Welaka, aged 67, died September 21.

Dr. Joseph Brown Farrior, Tampa, aged 50, died October 3 of carcinoma of the stomach with metastasis.

GEORGIA

Dr. James L. Campbell, Atlanta, was complimented at a dinner on October 5, on the occasion of his retirement from the active Staff of Grady Hospital, after serving forty years. Dr. Weldon E. Person, Atlanta, presented a silver loving cup to Dr. Campbell from the Medical School Faculty. Dr. Campbell is Professor of Clinical Surgery, School of Medicine, Emory University, and will continue as consultant to the hospital and will remain a member of the University faculty.

Dr. Walter C. Hays, Colquitt, recently was host to the members of the Tri-County Medical Society.

Dr. William C. Warren and Dr. William C. Warren, Jr., Atlanta, have moved their offices to the Doctors Building, 478 Peachtree Street.

Dr. Frank Boland, Atlanta, Dr. Trammell Starr, Dalton, and Dr. E. M. Bailey, Acworth, were recently guest speakers at the meeting of the Seventh District Medical Society at Cedartown.

A monument to the memory of Dr. Paul Fitzsimmons Eve was dedicated on November 14 at Augusta. Dr. Stewart R. Roberts, Atlanta, Dr. L. G. Hardman, Commerce, and Dr. John W. Daniel, Savannah, were appointed as a Committee to attend and represent the Medical Association of Georgia. Dr. Allen H. Bunce, Atlanta, was appointed by the Board of Trustees of the American Medical Association to represent that Association.

Dr. O. H. Cheek, Dublin, Commissioner of Health for Laurens County, cooperating with the County Board of Health, has done some very fine work in their fight against malaria in that County, especially in drainage work.

Dr. T. H. Johnston, Athens, has resigned as Health Officer for that city to accept a position in public health work in Michigan. Dr. W. W. Brown, Athens, has been appointed to succeed Dr. Johnston.

Dr. N. O. Tribble, Atlanta, has been appointed to the Drug Control Division of the Federal Food and Drug Administration.

Dr. E. Y. Walker, Atlanta, has moved his offices to the W. W. Orr Doctors Building.

The Fulton County Medical Society and the Fifth District Dental Society recently ratified plans to build jointly a permanent home in Atlanta for both organizations. It will be built at 27-33 Fifth Street, N. E., and will be known as the "Academy of Medicine and Dentistry."

Dr. and Mrs. L. C. Allen, Hoschton, recently entertained members of the Jackson County Medical Society at a luncheon, following their regular meeting.

The Georgia Urological Association met in Macon on October 29. Dr. W. F. Reavis, Waycross, is President and Dr. Allen F. Caldwell, Atlanta, is Secretary.

Dr. Charles E. Boynton, Atlanta, has been made President of the Georgia Pediatric Society, and Dr. Roger W. Dickson, Atlanta, Secretary.

Dr. William L. McDougall, Atlanta, has been elected President of the Georgia Eye, Ear, Nose and Throat Society, and Dr. William O. Martin, Jr., Atlanta, Secretary.

Dr. Comer Roger Youmans, Lumber City, and Miss Clarice Catherine Clark, Jacksonville, were married August 13.

Deaths

Dr. Burwell Atkinson, Waverly, aged 83, died September 22 of senility.

Dr. A. Clifford Crusselle, Atlanta, aged 55, died September 23 of heart disease.

Dr. Joseph C. Hooten, Ellerslie, aged 60, died September 25.

Dr. James Cloud Phillips, Savannah, died September 25.

KENTUCKY

Dr. Joseph W. Davis, Lexington, Health Director of Fayette County, has resigned and has accepted a similar position in Parkersburg, W. Va.

Dr. George M. Wells, former Health Officer of Trigg County, has been made Director of the Health Unit in Warren County, which has just been established.

Deaths

Dr. Charles William Anderson, Frankfort, aged 67, died August 25 of prostatic disease.

Dr. Leonard Cassell Berry, Lexington, aged 50, died September 22 of cerebral hemorrhage and arteriosclerosis.

Dr. George Alexander Budd, Frankfort, aged 60, died September 15 of angina pectoris.

Dr. Walter Legier Collidge, Louisville, aged 49, died September 3 of cardiovascularrenal degeneration and emphysema.

Dr. Zachary Taylor Cunningham, Princeton, aged 82, died August 29 of pneumonia.

Dr. John Franklin May, Ashland, aged 62, died September 14 of heart disease.

Dr. Charles F. Negley, Henderson, aged 77, died September 19 of thrombosis.

Dr. Henry Yost Slaton, Greenville, aged 59, died September 6.

Dr. William Joseph Morlan Smiser, Skylight, aged 74, died September 3 of organic heart lesion and pulmonary edema.

Dr. Samuel Ewing Standrod, Rockcastle, aged 68, died suddenly July 30.

LOUISIANA

The following appointments were recently made to the faculty of Louisiana State University School of Medicine, New Orleans: Dr. John Signorelli, Professor of Pediatrics; Dr. Ludo von Meysenbug, Professor of Clinical Pediatrics; Dr. George S. Bel, Honorary Professor of Medicine; Dr. Clarence P. May, Assistant Professor of Neuropsychiatry, and Howard Horace Beard, Ph.D., Professor of Physiologic Chemistry, all of New Orleans, except Professor Beard, who is from the Western Reserve University School of Medicine, Cleveland, Ohio.

Dr. Walter E. Sistrunk, Jr., Dallas, Texas, delivered the sixth Stanford E. Chaille Memorial Oration of the Orleans Parish Medical Society, New Orleans, on October 26. His subject was "Chronic Streptococcic Infections of the Female Genital Tract."

Dr. Leon J. Menville, New Orleans, has been made Editor of *Radiology*, the Journal of the Radiological Society of North America, succeeding Dr. Maximilian J. Hubeny, Chicago.

Dr. Charles W. Folsom, U. S. Public Health Service, New Orleans, has been transferred to duty at Nashville, Tennessee.

Dr. Daniel N. Silverman, New Orleans, delivered an address

Continued on page 34

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As a winter source of the much needed sunshine Vitamin D, cod liver oil has been aptly described as a wonderful clinical heritage.

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Continued from page 1148

at the recent meeting of the Third District Medical Society at Lafayette, and also to the Eighth District Medical Society meeting at Alexandria.

DEATHS

Dr. Felix Charles Guilbeau, Sunset, aged 53, died July 13.

Dr. Robert Harrison Johnson, Gretna, aged 59, died September 19 of gastric ulcer with hemorrhage and acute nephritis.

MARYLAND

The University of Maryland School of Medicine, Baltimore, has made the following promotions in the faculty: Dr. William H. Toulson, to Professor of Genito-Urinary Diseases; Dr. Nathan Winslow, to Professor of Clinical Surgery; Dr. Page Edmunds, to Professor of Clinical and Industrial Surgery; Dr. Walter D. Wise, to Professor of Clinical Surgery; Dr. Frank S. Lynn, to Professor of Clinical Surgery; Dr. Elliott H. Hutchins, to Professor of Clinical Surgery; Dr. Charles Reid Edwards, to Professor of Clinical Surgery; Dr. Harry M. Robinson, to Professor of Clinical Dermatology; Dr. James D. Reeder, to Clinical Professor of Diseases of the Colon and Rectum; Dr. Charles C. Hablston, to Associate Professor of Medicine; Dr. Ralph C. P Truitt, to Associate Professor of Psychiatry; and Dr. Herbert M. Foster, to Associate Professor of Surgery.

Dr. William D. Tillson, Baltimore, has been appointed Assistant Health Officer for Baltimore County.

The University of Maryland School of Medicine, Baltimore, has added a Department of Neurosurgery to the School, with Dr. Charles Bagley, Jr., in charge, and Dr. Richard G. Coblentz as associate.

Dorchester and Worcester Counties of Maryland have recently been made full-time health units, with Dr. Edgar A. P. Jones as Health Officer for Dorchester County, and Dr. Bradford Massey, Health Officer for Worcester County.

The Mayor of Baltimore recently appointed the following physicians to treat injured employees of Baltimore City on a fee basis: For the Bureau of Water Supply: Dr. Frank S. Hundley, Dr. Karl J. Steinmueller, and Dr. Frederick H. Vinup; for the Bureau of Highways: Dr. Herbert C. Blake, Dr. Leonard A. Richardson, and Dr. Walter W. White, Jr.; for the Bureau of Sewers: Dr. Harry J. Finkin, Dr. Maxwell L. Mazer, and Dr. William Wallace Walker; for the Mechanical-Electrical Bureau, Dr. Charles F. Coughlin and Dr. Anton G. Rytina; for all other bureaus in the Department of Public Works: Dr. Herman A. Voigt, Dr. Joseph Pokorny, Dr. William S. Smith, and Dr. Anthony V. Buchness.

The semi-annual meeting of the Medical and Chirurgical Faculty of Maryland was held on October 21 in Baltimore with Dr. Charles Reid Edwards, Dr. Emil R. Mayerberg, of Wilmington, Del., and Dr. William H. Welch as the principal speakers.

The American Association of Social Workers and the American Association of Hospital Workers have arranged a series of medical lectures for social workers to be given at the Medical and Chirurgical Faculty Building, Baltimore. Dr. Henry M. Thomas, Jr., Dr. Joseph Earle Moore, Dr. Lewellys F. Barker, Dr. Victor F. Cullen, Dr. Alexander J. Schaffer, Dr. Allen F. Voshell, Dr. Curtis F. Burnam, and Dr. Louis P. Hamburger will be the speakers at the different lectures.

Dr. Henry E. Sigerist, Professor of the History of Medicine and Director of the Institute of the History of Medicine of the University of Leipzig, has been appointed Visiting Lecturer in the History of Medicine for Johns Hopkins University School of Medicine for the academic year 1931-1932.

Dr. Samuel Alexander Vest, Baltimore, and Miss Elise Thompson, Graham, North Carolina, were married August 1.

Dr. Arthur Neal Owens, Baltimore, and Miss Georgia May Little, Atlanta, Georgia, were married September 30.

DEATHS

Dr. John Whitridge Williams, Baltimore, aged 65, died October 21.

Dr. Eugene Jones, Kensington, aged 58, died September 22, of diabetes mellitus.

Continued on page 36

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FILL OUT every blank on a case record. Word your description of conditions with the greatest care. Yet to some one other than yourself, this record may not give a true conception of the actual conditions that prevailed. After a lapse of time, filled with other cases, you may find your own description incomplete.

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Continued from page 34

MISSISSIPPI

The Delta Medical Society, at its semi-annual meeting on October 14, elected the following officers: Dr. George Baskerville, Greenwood, President; Dr. J. G. Archer, Greenville, Dr. W. A. Carpenter, Cleveland, Dr. U. S. Wasson, Moorhead, Dr. C. C. Hightower, Itta Bena, and Dr. G. M. Barnes, Belzoni, Vice-Presidents.

The Homochitto Valley Medical Society recently elected the following officers for 1932: Dr. Paul Jackson, Liberty, President; Dr. J. G. Logan, Natchez, Vice-President from Adams County; Dr. W. R. Brumfield, Gloster, Vice-President from Amite County; Dr. C. E. Mullens, Bude, Vice-President from Franklin County; Dr. W. H. H. Lewis, Fayette, Vice-President from Jefferson County; Dr. C. E. Catchings, Woodville, Vice-President from Wilkinson County; and Dr. W. K. Stowers, Natchez, Secretary-Treasurer.

Dr. H. Lowry Rush, Meridian, has been appointed Councilor for the Sixth District of Mississippi State Medical Association, succeeding Dr. W. G. Gill, deceased.

Friends of Dr. J. M. Dampeer, Crystal Springs, will be glad to know that he is able to be out after being confined to his home most of the time for the past six months.

A maternal hygiene institute for physicians was conducted recently at Houston, with Dr. J. R. McCord, of Emory University, Atlanta, giving the lectures.

Dr. George Wallace, Biloxi, has been elected a Fellow of the American College of Surgeons.

Dr. E. D. Gay, Gulfport, and Mrs. Lorine Badgley Brown were married on September 27 at Salt Lake City, Utah.

Dr. John Featherston Eckford, Starkville, and Miss Nellie R. Holmes, McComb, were married October 7.

Deaths

Dr. James Copeland, Tupelo, aged 72, died August 2 of myocarditis and dilatation of the heart.

Dr. George A. McHenry, McHenry, aged 73, died October 12 of chronic interstitial nephritis.

Dr. R. A. Segrest, Port Gibson, aged 54, died October 31 of carcinoma of the lung.

Dr. Rosa Douglas Wiss, Meridian, died September 14.

MISSOURI

The Callaway County Medical Society recently named the following officers for the ensuing year: Dr. C. H. Christian, Fulton, reelected President; Dr. E. McD. Rusk, New Bloomfield, Vice-President; and Dr. A. D. Ferguson, Fulton, reelected Secretary-Treasurer.

Dr. C. P. Fryer, Maryville, has been appointed Field Agent of the United States Public Health Service and Health Officer of Brown County, Kansas, with headquarters at Hiawatha.

The St. Louis Trudeau Club recently elected Dr. Alfred Goldman, St. Louis, President; Dr. Arthur Strauss, St. Louis, Vice-President; and Dr. R. L. Ehrlich, Koch, reelected Secretary-Treasurer.

The St. Vincent de Paul Hospital Chapel, which was recently built at Kingshighway Boulevard and Highland Avenue, St. Louis, was dedicated on October 7.

The St. Louis Maternity Hospital, St. Louis, received $1,000 in the will of the late David C. Biggs, who was former Governor of the St. Louis Federal Reserve Bank.

Dr. Dudley A. Robnett, Columbia, has been appointed Associate Professor of Surgery in the University of Missouri School of Medicine, after serving for nine years as Associate Professor of Pathology.

The annual session of the American Association of Railway Surgeons, which was to have convened in St. Louis on November 4-6, has been postponed for a year.

Dr. Clarence C. Pflaum, Columbia, has been appointed Assistant Professor of Pathology at the University of Missouri School of Medicine. Dr. Pflaum was formerly Instructor in Pathology at the University of Minnesota School of Medicine.

Continued on page 38

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Continued from page 36

Dr. William Washington Graves, St. Louis, has resumed his practice after devoting his full time for two and a half years to accumulating data on scapular types and problems of physical and mental adaptability.

DEATHS

Dr. Reuben Adcox, St. Louis, aged 69, died September 30.

Dr. Stephen Grover Burnett, Kansas City, aged 69, died September 11 of encephalomalacia.

Dr. Joel Y. Hume, Auxvasse, aged 79, died August 22 of cardiac insufficiency.

Dr. Charles T. McMurtrey, Kidder, aged 60, died August 21 of carcinoma.

Dr. J. Sherman Pope, St. Louis, aged 61, died October 12.

Dr. Byron T. Quigley, St. Joseph, aged 62, died September 30, following an illness of two years.

NORTH CAROLINA

Dr. P. J. Chester, formerly of Fayetteville, has moved to Southern Pines, specializing in eye, ear, nose and throat work.

Dr. E. A. Coats, Jr., Major, U. S. Army, has been transferred to Fort Humphries, after having been stationed at Fort Bragg for several years.

Dr. A. Wylie Moore, Charlotte, has moved his offices to the First National Bank Building.

Dr. G. H. Boyer, Fort Bragg, Major of the U. S. Army, has been transferred to the Hawaiian Islands.

The Duke Hospital, Durham, had lectures during the month of November given by Dr. R. W. Hagner, of the Johns Hopkins School of Hygiene on "Parasitology;" Dr. Louis B. Wilson, Director of Mayo Foundation, and Dr. Eugene F. DuBois, Professor of Medicine at Cornell University School of Medicine.

North Carolina pediatricians met at the Duke Hospital on November 13 and organized the North Carolina Pediatric Society.

Dr. J. C. Gittings, Professor of Pediatrics at the University of Pennsylvania School of Medicine, was the guest speaker at the regular meeting of the Durham-Orange County Medical Society on November 13, which was held at the Duke Hospital, Durham.

The Randolph County Medical Society was recently reorganized and the following officers elected for the year: Dr. C. C. Hubbard, Farmer, President; Dr. J. V. Hunter, Asheboro, Vice-President; and Dr. J. Robert Johnson, Ramseur, Secretary-Treasurer.

Dr. A. C. Duncan, Forest City, is now limiting his practice to eye, ear, nose and throat work.

Dr. W. P. Richardson, formerly of Lenoir, has moved to Winston-Salem.

Dr. C. H. Pugh, Gastonia, who has just been conferred the 33rd degree in Masonry, is the first Mason in Gaston County to receive this honor.

Dr. Fred Y. Ketner, Concord, and Miss Winnie D. Stokes, Newsom, were married August 3.

DEATHS

Dr. George Washington Bagley, Jr., Oteen, aged 40, died August 29.

Dr. J. F. Brewer, Asheville, aged 33, died October 24.

Dr. Ray Coman Sink, Winston-Salem, aged 30, was drowned August 20 while trying to save a girl.

OKLAHOMA

The Lincoln County Medical Society, at its meeting on October 7, had for guest speakers Dr. Horace Reed and Dr. L. J. Moorman, of Oklahoma City.

Dr. Ray M. Balyeat, Oklahoma City, was the principal speaker at the meeting of the Seminole County Medical Society on October 15.

Continued on page 40

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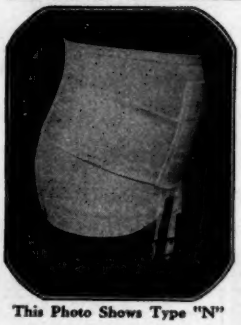

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Continued from page 38

DEATHS

Dr. Alfred Griffith, McAlester, aged 87, died October 10.

SOUTH CAROLINA

Dr. Douglas Jennings, Bennettsville, announces he is limiting his practice to surgery, gynecology and institutional obstetrics.

Dr. B. O. Whitten, who is Superintendent of the South Carolina Training School, Clinton, has been granted a six months' leave of absence to assist in establishing a State Training School in Utah.

Dr. W. Atmar Smith, Charleston, was elected President of the Association of Southern Sanatoriums at the recent meeting in Atlanta, Ga.

Dr. Edgar A. Hines, Secretary-Editor of the South Carolina Medical Association, attended the annual meeting of Secretaries and Editors of State Journals at the headquarters building of the American Medical Association, Chicago, which was held on November 13-14.

Dr. William Egleston, Hartsville, was recently elected Chairman of the State Board of Health

DEATHS

Dr. John William Geiger, New Brookland, aged 99, died August 24.

Dr. Charles Wilson Kollock, Charleston, aged 74, died September 23 of chronic myocarditis.

Dr. Hastings Wyman, Jr., Aiken, aged 52, died September 13 of angina pectoris.

TENNESSEE

Dr. James A. Crabtree, Nashville, who was Director of the Division of Preventable Diseases in the State Department of Health, has been appointed Assistant Professor of Epidemiology at Johns Hopkins University School of Medicine, Baltimore.

The Chattanooga and Hamilton County Medical Associations held a joint meeting on October 8, with Dr. Frederick E. Hasty and Dr. Hollis E. Johnson, Nashville, as the principal speakers.

Dr. Lloyd E. Dyer, Greeneville, was elected President of the East Tennessee Medical Association at its meeting on October 2.

Dr. Austin F. Barr has moved from Pulaski to Cherry Valley, Arkansas.

Dr. Erbie B. Clark, Sparta, and Dr. Harlan H. Taylor, Cookeville, were the guest speakers at the recent meeting of the Nine County Medical Society, at Monterey.

DEATHS

Dr. Norfleet Lynn Carney, Clarksville, aged 77, died August 9 of arteriosclerosis.

Dr. George P. Chambers, Savannah, aged 52, died September 8 of heart disease.

Dr. Joseph L. Davis, Winchester, aged 71, died September 9 of cerebral hemorrhage.

Dr. Robert E. Donahue, Knoxville, aged 47, died September 5 of malignant endocarditis.

Dr. William C. Hite, Nashville, aged 80, died July 26.

Dr. Thomas R. Logan, Lewisburg, aged 67, died August 28.

TEXAS

The Texas Public Health Association, formerly Texas Association of Sanitariums, held its annual meeting November 9-13 at Houston, with Dr. A. C. Hutcheson, City Health Officer, and Dr. H. K. Read, President of the Association, as joint directors of the meeting.

Dr. A. H. Flickwir, Fort Worth, has returned home after attending the recent meeting of the American Public Health Association in Montreal, Canada.

Dr. C. E. Jumper has moved to El Paso from Torreon Coahuila, Mexico.

Continued on page 42

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Continued from page 40

Dr. L. J. Neal has moved from Breckenridge to Kilgore.

Dr. John A. Crockett, Harlingen, has returned home after attending the International Rotary Convention in Vienna. While in Europe he did extensive postgraduate work in the various clinics.

Dr. J. V. Sessums, formerly of Galveston, has moved to Philadelphia, Pennsylvania.

El Paso is to have a new City-County Hospital, construction of which has been approved by the Hospital Board. The structure will cost $250,000 and architects have already been asked to draw the plans.

Classified Advertisements

OPHTHALMOLOGIST, Southerner, aged 32, eighteen months' eastern training, including considerable surgery, desires association, individual, clinic or eye ear, nose and throat group to do ophthalmology. Salary or percentage basis. Future primary consideration. Available February 1. Address H. C. S., care Journal.

X-RAY AND LABORATORY TECHNICIAN—Five years' experience in x-ray, all kinds of laboratory tests, metabolism, and physiotherapy. Also, do bookkeeping and typing. College graduate. Convincing references furnished as to my value to hospital or clinic. Address G. H., care Journal.

WANTED—Position as technician, or general office assistant in doctor's office. Three years experience in technician's work, also experience in stenographic work and bookkeeping. Can furnish best of references. Address E. L., care Journal.

TECHNICIAN—January first or sooner. Laboratory technician, with an A. B. degree from a Southern university, and with three years experience as assistant in 225-bed general hospital, desires position. References furnished. Age 27. Address H.D., care Journal.

FOR SALE—Victor Wantz Jr. X-Ray, 7-inch machine, remote control, direct current, including tube stand, two tubes, one 100 mille ampere radiator type and one 30 mille ampere Coolidge universal. Address H. H. Bryans, D.D.S., First National Bank Building, Birmingham, Alabama.

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Dr. Charles Wendelken has moved from Corpus Christi to Austin.

The Wilkerson Memorial Hospital, Bryan, was formally opened August 23. The building is a modern fire-proof two-story structure which represents an investment of $35,000.

Dr. F. D. White has moved from Wichita Falls to San Antonio.

The Freeport Hospital, Freeport, has recently had very extensive repairs and improvements to the building, with the installation of much additional equipment, including new furniture, new lighting fixtures and new adjustable hospital beds. This hospital is the property of the Hospital Association of the Freeport Sulphur Company, but is for the community as a whole and is available to all ethical physicians and their patients.

Dr. F. K. Anderson has moved from Fredericksburg to El Paso.

Dr. M. C. Carlisle, formerly of Cisco, has moved to Boston, Mass.

The Texas Pediatric Society held its fall meeting in Houston, November 17.

Dr. W. E. Frashuer has moved from Beeville to Sinton.

Dr. W. M. Greenwood has moved from Houston to Navasota.

Dr. Victor E. Schulze has moved from Galveston to Rochester, Minnesota.

Dr. E. T. Morris, San Benito, has returned home after a visit to clinics in St. Louis, New York, and Philadelphia.

Dr. R. L. Ramey and Dr. J. M. Britton, El Paso, recently attended the meeting of the Pacific Association of Railway Surgeons, which was held at Yosemite, California, and extended that Association an invitation to hold its 1932 convention in El Paso, which was accepted.

Dr. Charles W. Castner, Wichita Falls, has been reelected for the fourth consecutive time for a two-year term as Superintendent of the Wichita Falls State Hospital.

Dr. Craig Munter, Fort Worth, who has been doing postgraduate work in New York and St. Louis, has returned home.

Dr. Bloyce Hill Britton, El Paso, and Miss Helen Sterling Williston were married September 5.

Deaths

Dr. Benjamin Y. Boyd, Dallas, aged 72, died July 21.

Dr. Benjamin Franklin Holton, Mexia, aged 77, died June 28 of cerebral hemorrhage.

Dr. R. F. Minnock, Waco, aged 75, died August 9 of heart disease.

Dr. Eugene Hilliard Morgan, Granbury, aged 65, died September 9 of carcinoma of the pancreas.

Dr. James Henry Morgan, San Antonio, aged 57, died May 24 of heart disease.

Dr. George Street McReynolds, Temple, aged 59, died August 26.

Dr. Azariah Worthington Parsons, Oakwood, aged 74, died September 4 of chronic myocarditis.

Dr. B. G. Prestridge, Alvarado, aged 75, died August 5.

VIRGINIA

The Southside Virginia Medical Association will hold its next meeting in Petersburg on Tuesday, December 8.

The Virginia Pediatric Society, at its annual meeting in Roanoke, October 7, elected the following officers for the year: Dr. St. Geo. T. Grinnan, Richmond, President; Dr. W. W. Waddell, University, Vice-President; and Dr. J. B. Stone, Richmond, reelected Secretary-Treasurer.

The Southwestern Virginia Medical Society has elected the following officers for the ensuing year: Dr. George A. Wright, Marion, President; Dr. Nat Copenhaver, Bristol, Vice-President; and Dr. A. M. Showalter, Christianburg, reelected Secretary-Treasurer. Dr. A. B. Greiner, Rural Retreat, was elected a member of the Executive Committee. The next meeting will be held in Bristol in March, 1932.

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The Roanoke Academy of Medicine recently elected the following officers for the ensuing year: Dr. Everett E. Watson, President; Dr. F. A. Farmer and Dr. E. C. Ambler, Vice-Presidents; Dr. Charles H. Peterson, Secretary-Treasurer. Members of the Executive Committee elected were Dr. H. B. Stone, Dr. I. E. Huff, Dr. Paul Davis, Dr. E. C. Watson, and Dr. Churchill Robertson; members of the Judiciary Committee as elected are: Dr. J. W. Preston, Dr. H. H. Wescott, Dr. E. G. Gill, Dr. J. D. Willis, and Dr. W. L. Powell.

The South Piedmont Medical Society has elected the following officers for the year: Dr. C. W. Pritchett, Danville, President; Dr. J. J. Neal, Danville, Dr. F. O. Plunkell, Lynchburg, Dr. C. B. White, Halifax, and Dr. Thos. G. Hardy, Farmville, Vice-Presidents; and Dr. Geo. A. Stover, South Boston, reelected Secretary-Treasurer.

The Clinch Valley Medical Society, at its semi-annual meeting in September, elected the following officers for this year: Dr. Frank Pyott, Tip Top, President; Dr. G. B. Setzler, Pennington Gap, and Dr. V. W. Quillen, Nickelsville, Vice-Presidents; Dr. C. B. Bowyer, Stonega, reelected Secretary-Treasurer. The next meeting will be held at Appalachia.

The annual meeting of the Medical Society of Virginia was held in Roanoke in October and the following officers elected for this year: Dr. I. C. Harrison, Danville, President; Dr. J. C. Flippin, University, President-Elect; Dr. G. F. Simpson, Purcellville, Dr. F. H. Smith, Abingdon, and Dr. Warren T. Vaughan, Richmond, Vice-Presidents. The next meeting place will be named later by the Council.

Dr. Alpheus H. Wood, formerly of Emporia, is now connected with the medical staff at Catawba Sanatorium.

Dr. William F. Hatcher has moved from Bacova to Hot Springs.

Dr. Dwight Rivers, Lynchburg, has been appointed Assistant Director of the Southside Health District, Farmville.

Dr. A. S. Hurt, Jr., has located in Richmond and opened offices in the West End Medical Building, 2618 Grove Avenue, specializing in pediatrics.

Dr. E. T. Trice, Richmond, has been appointed a Major in in th eMedical Corps, U. S. Army.

Dr. Lula W. Garst, Catawba Sanatorium, has been granted a leave of absence from the Sanatorium and is spending the winter studying in the Department of Medicine at Johns Hopkins University, specializing in gastroenterology.

Dr. Reid White, Jr., Lexington, has been made First Lieutenant in the Medical Corps, U. S. Army.

The St. Philip Hospital School of Nursing dormitory and education unit, Richmond, was formally opened on November 10. The General Education Board and the Julius Rosenwald Fund contributed $120,000 toward this building.

Ex-Interns' Association of St. Elizabeth's Hospital held its eighth annual meeting in Richmond on October 15 and elected the following officers for the year: Dr. Raymond A. Vonderlehr, Washington, D. C., President; Dr. W. K. Dix, Richmond, Vice-President; and Dr. John S. Horsley, Jr., Richmond, reelected Secretary-Treasurer.

Dr. Frank S. Johns, Richmond, has been elected President of the Richmond Chapter of the Hampden-Sidney Alumni Association.

The Medical College of Virginia will construct a library immediately which will adjoin the library and home of the Richmond Academy of Medicine. The library will contain ample offices, work rooms, reference room, general reading room, five seminar rooms and faculty room, and the housing capacity for books will be approximately a hundred thousand volumes.

Dr. Edwin Foster Gouldman, Colonial Beach, and Miss Margaret Reid, Washington, D. C., were married October 13.

Dr. Troy Howell Hutchinson, Wise, and Miss Jo Ann Martha Donohue, Sun, were married October 7.

Dr. Clabe Webster Lynn and Miss Grace Lunsford Friend, both of Petersburg, were married October 17.

Dr. James Bannister Stone and Miss Janet Watkins, both of Richmond, were married November 3.

DEATHS

Dr. David C. Cline, Dumfries, aged 63, died August 16 of cardiorenal vascular disease.

Dr. Cooper Dave Kunkel, Pulaski, aged 83, died June 11.

Dr. Francis Page Nelson, Crozet, aged 44, died September 24 of heart disease.

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WEST VIRGINIA

The West Virginia Alumni Association of the Medical College of Virginia, Charleston, held its annual banquet on October 12 with forty-two present. Dr. William T. Sanger, President of the College, was the principal speaker, and Dr. Walter E. Vest, Huntington, was toastmaster.

Dr. U. W. Massie, formerly of Fincastle, Virginia, is now with the N. & W. Railway Y.M.C.A. at Bluefield.

Dr. Oscar B. Biern, Huntington, has been elected President of the Central Tri-State Medical Society.

Dr. Orra F. Covert, Moundsville, has recently been elected President of the West Virginia Tuberculosis and Health Association.

The Ohio County Medical Society, at its meeting on October 2, had for its guest speaker Dr. Charles Goodman, New York, who spoke on "Acute Conditions in the Abdomen."

Dr. Arthur P. Butt, Elkins, was the principal speaker at the meeting of the Eastern Panhandle Medical Society at Charles Town, September 9.

Dr. Howard T. Phillips, Wheeling, was a guest of the Tyler-Wetzel Bi-County Medical Society, and presented a paper on "Lesions of the Skin" at their meeting on September 9.

DEATHS

Dr. Clark R. Campbell, Williamsburg, aged 73, died September 10.

Dr. M. R. Stone, Parkersburg, aged 53, died September 4 of coronary occlusion.